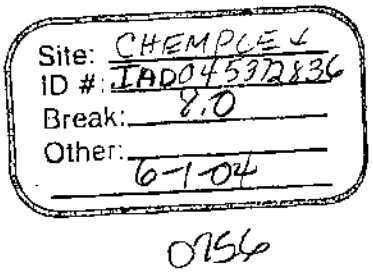
Second Five-Year Review Report

for

Chemplex Site

Clinton County, Iowa

June 2004



PREPARED BY:

U.S. Environmental Protection Agency
Region VII
Kansas City, Kansas

Approved by:

Cecilia Tapia
Director, Superfund Division

Date: 6/3/04

Table of Contents

Tables

Figures

Figure 10 - PCE Concentrations Detected in Groundwater Samples from Lower Hopkinton
Figure 11 - PCE Concentrations Detected in Groundwater Samples from Blanding
Figure 12 - Concentrations of Chemicals other than PCE Detected in Above Cleanup Goals
Figure 13 - Cumulative Mass Removal of Target Compounds by LGE System
Figure 14 - Total VOC and BNA Stream Emissions

Attachments

Attachment A- March 7, 2002 Letter from Nancy Swyers to Mark Hendrickson regarding Responses to EPA Comments
Attachment B- Notice of Environmental Cleanup, Access Easements, and Restrictive Covenants
Attachment C- April 5, 2002 Letter from M. Lynn Hudacek to Nancy Swyers regarding detects from analyses for the Clinton County Groundwater Monitoring Project
Attachment D- Erler & Kalinowski, November 2003 Potentiometric Surface and Historic Head Surfaces
Attachment E - Site Photographs
Attachment F - May 19, 2004 Email from Cal Lundberg to Nancy Swyers regarding NPDES Information
Attachment G- Combined VOC and BNA Air Stripping Tower Emissions for 2003 and Risk Analyses and Evaluation

List of Acronyms

ACC/GCC	ACC Chemical Company and Getty Chemical Company
AOA	Area of Attainment
AOCs	Areas of Concern
AR	Administrative Record
ARARs	Applicable or Relevant and Appropriate Requirements
BNA	Base Neutral Acid
CAP	Coalition Against Pollution
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
DAC	Debutanized Aromatic Compound
DCE	Dichloroethene
DOJ	Department of Justice
DNAPL	Dense Non-aqueous Phase Liquid
EA	Endangerment Assessment
EKI	Erler and Kalinowski, Inc.
EPA	U. S. Environmental Protection Agency
ESD	Explanation of Significant Differences
EW	Extraction Well
GAC	Granular Activated Carbon
GPM	Gallons Per Minute
HAL	Health Advisory Level
IDNR	Iowa Department of Natural Resources
LNAPL	Light Non-aqueous Phase Liquid
MCL	Maximum Contaminant Level
MW	Monitoring Well
NAPL	Non-aqueous Phase Liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NRL	Negligible Risk Level
O&M	Operation and Maintenance
PAH	Polynuclear Aromatic Hydrocarbons
PCE	Tetrachloroethylene or Trichloroethene
PME	Performance Monitoring Evaluation Plan
POC	Point of Compliance
PRP	Potentially Responsible Parties
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action

List of Acronyms (continued)

RI/FS	Remedial Investigation and Feasibility Report
ROD	Record of Decision
SDWA	Safe Drinking Water Act
SOW	Statement of Work
TCE	Trichloroethylene or Trichloroethene
3-D	Three Dimensional
µg/l	microgram per liter
UHL	University of Iowa Hygienics Laboratory
VOC	Volatile Organic Compounds

Executive Summary

The Chemplex Company Superfund Site (Site) is located on a portion of the Equistar, LP polyethylene manufacturing facility which is located west of Clinton, Iowa. A number of areas of concern (AOCs) at the site were identified from historical waste disposal practices and/or previous investigations. The remedy for the Site included a groundwater extraction and treatment system for operable unit (OU) 1 and a landfill gas extraction system and capping for the landfill area for OU 2. Construction completion of the OU 1 portion of the site was accomplished with the signing of the Preliminary Closeout Report on September 14, 1995. Construction completion for the OU 2 portion of the site was accomplished as documented in a report by the PRPs dated December 31, 1998. The trigger for this five-year review was the signing of the first Five-Year Review Report on June 9, 1999.

The determination that has been made during this five-year review is that the remedy continues to be protective.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name *(from WasteLAN)*: Chemplex Company

EPA ID *(from WasteLAN)*: IAD045372836

Region: 7 | **State:** IA | **City/County:** Clinton/Clinton County

SITE STATUS

NPL status: ☐ Final ☐ Deleted X Other (specify) Superfund Alternative

Remediation status (choose all that apply): ☐ Under Construction X Operating ☐ Complete

Multiple OUs?* X YES ☐ NO | **Construction completion date:** 12/31/98

Has site been put into reuse? ☐ YES X NO

REVIEW STATUS

Lead agency: X EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____

Author name: Nancy J. Swyers

Author title: Remedial Project Manager | **Author affiliation:** U.S. EPA - Region 7

Review period:** 10/1/2003 to 6/1/2004

Date of site inspection: 10/1/2003

Type of review:
X Post-SARA ☐ Pre-SARA ☐ NPL-Removal only
☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead
☐ Regional Discretion

Review number: ☐ 1 (first) X 2 (second) ☐ 3 (third) ☐ Other (specify)

Triggering action:
☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#____
☐ Construction Completion X Previous Five-Year Review Report
☐ Other (specify) _____

Triggering action date *(from WasteLAN)*: 6/9/1999

Due date *(five years after triggering action date)*: 6/9/2004

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:
PRPs, ACC/GCC, have requested a proposed remedy revision. There is contamination in one of the Equistar wells.

Recommendations and Follow-up Actions:
EPA, IDNR, and ACC/GCC are continuing to have discussions regarding the proposed remedy revision. ACC/GCC and Equistar will submit a proposal regarding resolution of Equistar well.

Protectiveness Statement: The remedy at the Chemplex site is protective of human health and the environment.

Second Five-Year Review Report

I. Introduction

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review Reports. In addition, Five-Year Review Reports identify issues found during the review, if any, and recommendations to address them.

The Agency is preparing this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(c) and the National Contingency Plan (NCP). CERCLA § 121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The agency interpreted this requirement further in the NCP; 40 C.F.R. § 300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency (EPA) Region VII has conducted a five-year review of the remedial actions implemented at the Chemplex site in Clinton County, Iowa. This review was conducted from October 2003 through June 2004. This report documents the results of the review.

This is the second five-year review for the Chemplex site. The triggering action for this review is the date of the first five-year review, as shown in EPA's WasteLAN database: June 9, 1999. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain on the site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Table 1
Chronology of Site Events

Event	Date
Chemplex facility (now Equistar LP) started operation	1967
Listing on Proposed National Priorities List (NPL)	10/15/84
Consent Order for Remedial Investigation/Feasibility Study (RI/FS)	9/8/87
OU 1 Record of Decision (ROD) signed	9/27/89
OU 2 Consent Order for RI/FS	12/28/89
Deleted from Proposed NPL	2/11/91
Explanation of Significant Differences (ESD) finalized	7/26/91
OU 1 Consent Decree (CD) for Remedial Design/Remedial Action (RD/RA) finalized	11/7/91
OU 2 ROD signed	5/12/93
OU 1 Remedial Design (RD) completed	2/2/94
OU 1 Remedial Action (RA) construction began	5/31/94
OU 2 CD for RD/RA finalized	2/6/95
OU 1 Preliminary Close Out Report signed	9/14/95
OU 2 RD Completed	12/18/96
Previous five-year review	6/9/99
OU2 Soil Vapor Extraction (SVE) System ceased operation	4/9/03

III. Background

Physical Characteristics

The Chemplex Site is located approximately five miles west of Clinton, Iowa, south of U.S. Highway 30 and west of Route 67 as indicated on Figure 3a. The 700-acre site includes the high-density and low-density polyethylene manufacturing plant operated by Equistar Chemicals, LP (formerly Quantum) and the agricultural fields that surround the plant. The plant itself is located on approximately 230 acres of land enclosed by a fence. The plant has been in operation since approximately 1967. Originally, the City of Clinton owned the plant and the land on which

it is located. ACC Chemical Company and Getty Chemical Company (ACC/GCC), operated the plant until 1984 and are the current owners of the seven-acre landfill area on the western portion of the site. Equistar currently operates the plant and owns the plant property, excluding the landfill area.

Land and Resource Use

The Site is located west of the Camanche and Clinton communities in a predominantly agricultural area between U.S. Highway 30 and Hawkeye Road. The former PCS Nitrogen Facility, a former fertilizer manufacturing plant, previously known as Hawkeye Chemical and Arcadian, is located southeast of the Chemplex Site on the south side of Hawkeye Road. The Lawrence Todtz Farm Site is located approximately one mile south of the Site. The residences surrounding the Site are served by private drinking water wells.

Two unnamed tributaries to Rock Creek bound both the eastern and western portions of the site and flow south, draining into Rock Creek approximately 2,200 feet south of the plant. Below the confluence with these unnamed tributaries, Rock Creek flows to the east and then to the south. Approximately one and a half miles southeast of the site, Rock Creek flows adjacent to some local lakes. During high water conditions, the creek and lakes are hydraulically connected through a culvert. Rock Creek eventually discharges to the Mississippi River approximately two miles south of the site.

Site Geology

The geological formations underlying the Chemplex Site are depicted on Figure 3b. In essence, the overburden formation consists of a mixture of clay and silt with variable amounts of sand and gravel and overlies three separate bedrock formations. The bedrock formations overlie the Maquoketa Shale which is considered the regional aquitard (i.e., confining unit). The overburden varies in thickness from one to 90 feet with the thinner portions being in the northern portion of the site. The Scotch Grove formation is characterized by an upper and lower unit which has been interpreted to reflect the difference between the relatively weathered and porous rock in the upper unit compared to the unweathered and dense rock below. The upper unit of the Hopkinton formation is the Picture Rock formation, which has relatively low porosity and hydraulic conductivity compared to the formations above and below. As a result, this formation may be retarding the vertical migration of contaminants to the underlying Farmers Creek and Lower Hopkinton formations as well as the Blanding formation.

Site Hydrogeology

Groundwater occurs in both the overburden and underlying bedrock formations. In general, groundwater flows from the north to the south, with an increasing hydraulic gradient in the southwest and southeast areas near the tributaries. In the vicinity of the tributaries, the flow directions are skewed toward the tributaries, even in the lower bedrock members.

Calculated hydraulic gradients within the overburden, based on water levels measured at locations with nested shallow and deep wells, suggest typically downward flow across the entire site. Vertical gradients within the individual bedrock units, measured prior to implementation of the extraction system, indicate various upward and downward trends, depending on the location at the site (EKI, 1999a). Generally, upward hydraulic gradients were observed near the west tributary in all formations based on water levels obtained from nested wells. Upward gradients are generally regarded as favorable for minimizing the vertical migration of contaminants into relatively uncontaminated groundwater below the Picture Rock.

History of Contamination

Plant wastes containing hazardous substances, including chlorinated hydrocarbons (tetrachloroethylene (PCE), trichloroethylene (TCE) and their breakdown products), benzene toluene, ethylbenzene, xylenes, and polynuclear aromatic hydrocarbons (PAHs) were disposed of at a number of areas at the facility and have resulted in groundwater contamination beyond the facility boundary. As indicated on Figure 3c, a number of potential areas of concern (AOCs) at the site were identified from historical waste disposal practices and/or previous investigations. These areas are the seven-acre landfill (as mentioned above), Debutanized Aromatic Compound (DAC) Storage and Truck Loading Area, Polishing Basin, Previous Basin, Former Waste Pile F, Former Container Storage Area H, Surface Impoundment B, Surface Impoundment C, Surface Impoundment D, and the DAC Spill Area. These areas are discussed in more detail in the Chemplex OU 2 RI and the Chemplex OU 2 ROD. A brief description and history of each of these areas are presented below.

Landfill Area

The landfill is located near the west-central boundary of the fenced portion of the site and covers approximately seven acres. From 1968 to 1978, the landfill was used for disposal of various plant wastes generated at the polyethylene manufacturing facility including black oily sludge, scrap polyethylene, construction debris, carbonate sludge, and spent solvents. The plant wastes have contaminated the soil and groundwater underneath the landfill.

DAC Storage and Truck Loading Area

The DAC storage and truck loading area is an active operation area that has been in use since the inception of facility operations in 1968. The area is used primarily for the storage and transfer of DAC, a by-product of the polyethylene production process. The area contains 11 aboveground storage tanks, a transfer pump station, a truck loading area, and a rail tank car loading area. Historically, this area was not paved or otherwise protected from surface water infiltration. As a result, soil and groundwater contamination is present. However, paving and compaction activities have reduced the potential for surface water infiltration.

Polishing Basin

Polishing Basin

This area is currently used by Equistar as a tertiary process water treatment unit that receives process water from a biological treatment unit. The polishing basin was originally constructed with a clay liner in 1968 and was used as a process water-settling pond. In 1974, the polishing basin was dredged. During dredging, the clay liner was damaged causing contaminants to leach into the underlying soil.

In 1982, the polishing basin was drained and the damage to the clay liner from the 1974 dredging was discovered. The polishing basin was rebuilt with a new liner consisting of compacted clay, bentonite, and a high-density polyethylene liner. A leachate collection system was also installed and included a system of horizontal piping that underlies the polishing basin. An additional groundwater collection system is located downgradient of the polishing basin consisting of four french drains and two collection wells. A french drain is located in the ditch between the polishing basin and Hawkeye Road with the other french drains and the collection wells located south of Hawkeye Road.

Former Waste Storage Areas

The polishing basin, Waste Pile F, Container Storage Area H, and Surface Impoundments B, C, and D, are all areas of the site that at one time contained either wastewater treatment plant waste or polyethylene process waste. All of the wastes and sludges from these areas were ultimately excavated and disposed offsite.

Debutanized Aromatic Compound (DAC) Spill Area

This area includes the DAC storage tank, the bermed area for the tank, and the drainage ditch adjacent to the bermed area. In March 1982, a line from the DAC storage tank ruptured, spilling approximately 37,000 gallons of DAC into the bermed area. Although most of the spilled material was contained in the bermed area and recovered, approximately 1,500 gallons escaped through the drainage pipe. Approximately 1,000 gallons of the 1,500 gallons that escaped were recovered. The remaining 500 gallons flowed south in a drainage ditch that eventually drains into the Unnamed Tributary to Rock Creek, located on the western portion of the site.

Initial Response

The Chemplex Site was identified as a potentially uncontrolled hazardous waste site and was proposed for the National Priorities List (NPL) in 1984. The site was later deleted from the proposed NPL under the Resource Conservation, and Recovery Act (RCRA) deferral policy in 1991. This site is being addressed as an Superfund Alternative site.

Chemplex OU 1

On September 8, 1987, EPA entered into an Administrative Order on Consent with certain Potentially Responsible Parties (PRPs), USI (now Equistar) and ACC/GCC, to investigate the Landfill and DAC storage and truck loading area. The Consent Order was issued pursuant to Section 106(a) of CERCLA, 42 U.S.C. §9606(a), and Section 3013 of RCRA, as amended, 42 U.S.C. §6934. A summary of the results of this investigation and previous investigations is included in the Remedial Investigation and Feasibility Report (RI/FS) that was completed by the PRPs in June 1989. With this information and other documents available in the Administrative Record (AR) file, EPA issued the first Record of Decision (ROD) for this site in September 1989, which selected groundwater extraction and treatment for the Landfill and the DAC storage and truck loading areas. This ROD was later modified by an Explanation of Significant Differences (ESD) to include groundwater extraction and treatment for the entire site. The groundwater extraction and treatment remedy was considered Operable Unit Number One (OU 1) for the site.

The PRPs conducted the Remedial Design/Remedial Action (RD/RA) required by the ROD and ESD pursuant to a Consent Decree (CD) which was signed by EPA and the PRPs, lodged by the Department of Justice (DOJ), and entered by the Federal District Court for the Southern District of Iowa on November 7, 1991. The RD for the site was completed by the PRPs and approved in February 1994. The RA commenced in May 1994 with the construction of the groundwater extraction and treatment system. Construction was completed in July 1995. The groundwater extraction and treatment system is currently in operation.

Chemplex OU 2

At the time the first ROD was issued, EPA determined that there was not sufficient information concerning the nature and extent of soil contamination at the site to select a remedy for soil cleanup. Therefore, on December 28, 1989, EPA entered into an Administrative Order on Consent with the PRPs to conduct a Second Operable Unit (OU 2) RI/FS. This Order was issued pursuant to Sections 104(b) and 122(d) of CERCLA, 42 U.S.C. §§9604(b) and 9622(d). The RI/FS was completed in December 1992. The EPA issued a ROD for OU 2 in May 1993 which essentially included groundwater suppression, capping, and a soil vapor extraction (SVE) system for the Landfill area; establishment of vegetative covers in other areas of the site; and institutional controls in all areas. The CD for OU 2 was signed by EPA and the PRPs, lodged by DOJ and finalized in February 1995. Construction commenced in April 1997 and was completed in January 1998. The SVE system was in operation until April 9, 2003.

Basis for Taking Action

During the RI phase for OU 1, the PRPs prepared and submitted to EPA a "Draft Endangerment Assessment" (EA) for the purpose of evaluating the existing and potential impacts of the site on human health and the environment. Other information was added to the AR to more fully characterize potential human health effects from the groundwater pathway of

exposure. One of the EPA reports added to the AR is titled "Chemplex Facility Site, Clinton, Iowa; Endangerment Assessment of Potential Groundwater Exposure," dated September 22, 1989, which was prepared for EPA by Jacobs Engineering Group. The risk evaluations, including potential human health carcinogenic and noncarcinogenic effects as well as an ecological exposure assessment from the contaminants of concern at the site, are included in the Chemplex OU 1 ROD.

In summary, it was determined that both noncarcinogenic risks and excess lifetime cancer risks from exposure to the contaminants in the onsite groundwater would be unacceptable. The noncarcinogenic and carcinogenic risks would be considered in the acceptable risk range for worker's exposure to surface soils in the DAC area and for children's exposure to surface water. Regarding the ecological assessment, the Chemplex OU 1 ROD stated that "Based on available data, it does not appear that terrestrial and aquatic organisms are adversely impacted by the site."

The primary basis for the OU2 remedial action was to reduce the mass of contaminants for release into groundwater. Potential risks from exposure to contaminated soils and wastes were discussed in the Chemplex OU 2 ROD. In summary, the baseline risk assessment conducted for the soils and wastes concluded that there would not be unacceptable carcinogenic or noncarcinogenic risks posed by exposure to the onsite soils and wastes. Essentially, the potential noncarcinogenic risks were determined to be in the acceptable range and the potential carcinogenic risks were determined to be less than the excess lifetime cancer risk of 10^{-4}, which EPA considers to be acceptable. Existing conditions at the site were also determined to be protective of potential ecological receptors.

IV. Remedial Actions

Remedy Selection

Based on the potential risks of exposure to contaminants identified in the onsite groundwater, the focus of the Chemplex OU 1 ROD was protection of potential receptors of the groundwater. The ROD, which focused on the Landfill and DAC areas, states that "The purpose of this operable unit remedial action is to mitigate the movement of the contaminated groundwater from this site and to permanently treat, destroy and dispose of contaminants found in these groundwater plumes. Also, this operable unit should protect the nearby downgradient private drinking water wells from these plumes prior to implementation of the final remedial action for this site." Subsequent to the ROD, the ESD modified the ROD to include implementation of a site-wide groundwater remedy that included a point of compliance (POC) boundary. The remedial objectives were more clearly defined during the RD and included the following:

- (1) Extract highly contaminated groundwater within the POC that is not related to NAPL source areas to the extent appropriate to significantly expedite completion of the RA,
- (2) Extract groundwater such that the cleanup standards specified in the CD are met downgradient of the POC,
- (3) Extract LNAPL where feasible and where such recovery will reduce the migration of contaminants of concern downgradient of the POC,

- (4) Prevent further vertical migration of DNAPL into the bedrock aquifer,
- (5) Prevent further horizontal migration of compounds of concern into areas outside of the POC,
- (6) Lower the groundwater table in areas of source soils as may be required for the Chemplex OU 2 RA, and
- (7) Treat extracted groundwater so that effluent concentrations comply with levels specified in the National Pollution Discharge Elimination System (NPDES) permit.

The purpose of the remedy in the Chemplex OU 2 ROD was to address contaminated soils and wastes at the Site that present a threat to human health and the environment from direct exposure or from indirect exposure through migration of contaminants into groundwater. Together, both remedies should address all human health and environmental risks at the Site. The specific remedial objectives for OU 2 are as follows:

- (1) Reduction of carcinogenic risks to onsite workers and construction workers from direct dermal and inhalation exposure to soils to a risk level of approximately 1 x 10^{-6} or less.
- (2) Reduction of migration of contaminants into groundwater to the maximum extent practicable, consistent with the OU 1 groundwater remedy.

Remedy Implementation

First Operable Unit

In a Consent Decree (CD) entered into with the United States on November 7, 1991, ACC/GCC agreed to perform the OU 1 RD/RA and pay past costs. The RD was conducted in conformance with the ROD. The RD was approved by the EPA on February 2, 1994.

The remedy for Chemplex OU 1 Site as selected in the ROD and modified in the ESD includes the following components: (1) Institutional Controls, (2) Groundwater Extraction/Plume Containment, (3) Non Aqueous Phase Liquid (NAPL) Management, (4) Groundwater Treatment and Discharge, (5) Construction, Operation, and Maintenance, and (6) Verification and Monitoring System. Pursuant to the CD, ACC/GCC was required to implement the remedy. Figure 4a depicts the groundwater extraction and treatment components. Attachment E also contains a photographic log that includes the extraction and treatment components. All of the RA components are discussed in more detail as follows.

Institutional Controls

Institutional controls are required to restrict the use of groundwater until the required cleanup levels are achieved. The Iowa Environmental Quality Act, Iowa Code Ann. 455B, and the Iowa Admin. Code, Chapter 38, require that routine installation of all private water wells be permitted by IDNR or its designee. This authority may be used to restrict installation of wells in the pathway of the plumes. In addition, this site has been placed on the Iowa registry of hazardous waste sites by IDNR, which requires placing by the state of a notice on the deed

preventing sale of the site or change in land use without approval by the state. Deed restrictions are also required for the adjacent property, under which the contaminated groundwater plumes are migrating. Such restrictions would be implemented by the state of Iowa or the local government. The status of the restrictive covenants and access easements are discussed in more detail in the section of this report titled "**Status of Recommendations and Follow-up Actions from Last Review**".

Pursuant to the OU 1 CD, ACC/GCC, Quantum (now Equistar), and the city, who were all owners of the property within the Area of Attainment (AOA) at that time, were required to submit restrictive covenants and access easements to the Recorder of Deeds of Clinton County for recording. Restrictive covenants prohibit the construction, installation, maintenance or use of any wells for drinking water wells or crop irrigation (with the exception of the existing Equistar production wells which are screened below the Maquoketa formation). The purpose of the access easements was to reserve access for ACC/GCC to implement the remedy.

Groundwater Extraction/Plume Containment

As indicated earlier in this report, the remedy includes a POC boundary because it was acknowledged during the ESD that it would be impracticable to treat the DNAPL contaminated groundwater at the source areas to the required cleanup standards. However, the groundwater must be extracted and treated downgradient of the POC boundary to achieve cleanup standards that are protective of human health and the environment. As indicated earlier, the groundwater flow direction is generally from north to south. Figure 4a illustrates the POC boundary. All groundwater must meet health-based groundwater cleanup standards at this boundary.

The cleanup standards established at the time of the CD are listed on Table 1a. Changes were subsequently made to the PCE, styrene, and PAH cleanup standards as discussed in the June 1999 Five-Year Review Report. The subsequent cleanup standards are contained in Table 1b.

In order to achieve the objectives for the RA, various groundwater extraction well alternative locations and depths were evaluated during the RD with the use of the ACC/GCC three-dimensional (3-D) hydrologic model. As indicated on Figure 4a, groundwater extraction wells were installed in strategic areas and screened over the five geologic formations to pump contaminated groundwater out of the ground and into common lift stations and then to the treatment plant. A total of five lift stations and 51 groundwater extraction wells were constructed and initially in operation. Since that time, one extraction well was taken out of service due to silting and 8 additional extraction wells have been taken out of service due to low chemical mass removal and undesirable downward hydraulic gradients. Table 1d from the latest quarterly progress reports contains information on the wells that have been taken out of service. The extraction wells are located at different depths and have differing flow rates (ranging anywhere from one to 20 gallons per minute).

NAPL Management

The CD states that "Where NAPL extraction is determined to be appropriate, it shall be separated from the groundwater, with the groundwater effluent to be treated and the remaining material to be transported for off-site disposal as a RCRA-hazardous waste . . ." Light non-aqueous phase liquid (LNAPL) has been discovered in monitoring and extraction wells located in the landfill, DAC loading area, and south of the polishing basin. Certain wells in these areas have been equipped with 12 inch casings and conductivity probes in order to be able to detect and extract LNAPL, if feasible. At this time, LNAPL has not been detected in sufficient quantities in the Chemplex OU 1 groundwater extraction and treatment system to warrant recovery. Dense nonaqueous phase liquids (DNAPL) have been located in the source area. The DNAPL source is believed to be in equilibrium and remediation or extraction of the DNAPL is not believed to be feasible without increasing the release of DNAPL components to the dissolved phase, thereby increasing the potential risk to human health and the environment. Remediation efforts have targeted extraction of the dissolved plume from the DNAPL area.

Groundwater Treatment and Discharge

The contaminated groundwater is treated in two separate streams. The first stream, the base neutral acid (BNA) stream, is groundwater containing semivolatile organic compounds (including PAHs), and high concentrations of volatile organic compounds (VOCs). The second stream, the VOC stream, is groundwater containing primarily VOCs, although the VOC concentrations are higher in the BNA stream.

Both streams are separately discharged into two influent equalization tanks with the purpose of equalizing the amount of water entering the system. Each stream is then treated by greensand filtration to remove iron, manganese, and suspended solids. These filters protect the air strippers (and Granular Activated Carbon (GAC) filters for the BNA stream) downstream from particulate loading.

Two column packed air stripper towers (each 45 feet tall) remove VOCs from the water of both streams. Off-gas from the VOC stream air stripper is discharged to the atmosphere. The groundwater remediation system originally incorporated a catalytic oxidizer to optionally treat the exhaust gas from the BNA stream air stripping tower. Operation of the catalytic oxidizer was discontinued after the first year of operation because ACC/GCC demonstrated that the exhaust gas did not exceed emission standards. Since emission values have remained steady, it was assumed that the catalytic oxidizer would not be needed for BNA stream emission control. Therefore, the catalytic oxidizer was modified to treat extracted landfill gas as part of the Chemplex OU 2 RA. Currently, off-gases are discharged to air from vents on the roof.

The groundwater remediation treatment system uses two chemicals for process control. Sodium hypochlorite is injected into both streams prior to the equalization (influent) tanks and is used to oxidize iron and manganese in the treatment system influent, as well as preventing biofouling in the greensand filters. A blend of Calgon C-5 Polyphosphate is injected into both streams just prior to the air stripping towers and is used to prevent the formation of calcium carbonate scale in the system.

The BNA stream flows through GAC vessels to remove semivolatile compounds. The two vessels are located by the east wall of the treatment facility so that spent carbon can be exchanged for new carbon directly from a semitrailer parked outside the building.

Treated effluent from both the VOC and BNA streams are combined in an effluent equalization tank. The effluent is pumped from this tank and is discharged to the Equistar polishing basin outfall (which is monitored to ensure compliance with the NPDES permit) to the Mississippi River.

Solids generated from the treatment process, including greensand filter backwash and carbonate scale from the air strippers, are discharged to one of two settling tanks. To assist the settling process, a polymer is added to the backwash fluids as the fluids are entering the settling tanks. After the settling process is complete, the clear water is decanted off and is returned to the BNA equalization tank for re-treatment. The sludge from the settling tanks is then pumped to the Equistar treatment plant.

Construction

Pursuant to the CD for RD/RA, ACC/GCC completed the final RD which was approved by EPA in February 1994. ACC/GCC completed construction of the groundwater extraction and treatment system in July 1995. EPA documented construction completion in the Preliminary Closeout Report which was signed on September 14, 1995. The groundwater extraction and treatment system is currently in operation.

Second Operable Unit

In a CD entered into with the United States on February 6, 1995, ACC/GCC agreed to perform the OU 2 RD/RA and pay past costs. The RD was conducted in conformance with the ROD. The RD was approved by the EPA on December 18, 1996.

The major components of the OU 2 remedy as indicated on Figure 5a are:

- (1) groundwater suppression, soil vapor extraction (SVE), and capping in the Landfill Area;
- (2) capping of the H-2 area of the DAC Storage and Loading Area;
- (3) establishment and maintenance of a vegetative cover in the Previous Basin Area, Former Waste Pile F, and Surface Impoundments B and D; and
- (4) institutional controls in all areas.

As part of the construction required for the RA, capping of the Landfill and H-2 area; establishment of vegetative covers in the Previous Basin Area, Former Waste Pile F, and Surface Impoundments B and D; and construction of the SVE system in the Landfill Area were completed 1998. Warning signs were also placed in all areas. The SVE system (also referred to as the Landfill Gas Extraction (LGE) System) includes a blower, 55 vapor extraction wells and a catalytic oxidizer to treat vapors. The layout of the LGE System in the Landfill Area is indicated on Figure 5b.

The CD Statement of Work (SOW) established shutdown criteria for the LGE System. The SOW established two categories of shutdown criteria:

- Concentration-based criteria, evaluated by comparing the concentrations of Target Compounds (i.e., benzene, toluene, ethylbenzene, total xylenes, and PCE) in a given well or well cluster to the measured pre-startup concentrations.
- A time-based criterion, evaluated by comparing the cumulative time of active extraction at a given well or group of wells. The time-based criterion is considered to have been met after four years of cumulative active extraction.

As described in the SOW, the LGE System could be shut down upon satisfying any one the concentration-based or time-based shutdown criteria. As shown on Table 2, the four-year time-based shutdown criterion was met as of April 9, 2003. The calculation approach shown in Table 2 was approved by EPA in a letter dated March 7, 2002, included as Attachment A.

Based on satisfaction of the time-based criterion and approval by EPA, ACC/GCC permanently ceased operation of the LGE System on April 9, 2003. ACC/GCC also permanently ceased operation of light non-aqueous liquid (LNAPL) recovery from the LGE wells.

System Operations/Operation and Maintenance

First Operable Unit

Pursuant to the CD, ACC/GCC is required to operate and maintain the entire system or portions of the system until certification of completion of the RA. In order to certify completion of the RA, ACC/GCC must either demonstrate that compliance with the Cleanup Standards stated in Table 1b have been achieved throughout the AOA or that compliance with the Cleanup Standards is not technically practicable according to the CD SOW. In the OU1 CD, ACC/GCC agreed to operate the groundwater extraction and treatment system for a minimum of fifteen years before requesting modification of the remedy based on technical impracticability. That 15 year time period has not yet run. Also as required by the CD SOW, an Operation and Maintenance (O&M) Plan is available to the onsite operators which includes description of procedures for operation and maintenance of monitoring wells, extraction wells, water level recorders, the treatment system, and any other structure or equipment constructed or installed pursuant to the RA.

Verification and Monitoring System

Pursuant to the CD, ACC/GCC was required to design, install, and maintain a system to monitor the performance of the groundwater extraction and treatment system. Specifically, the system is required to verify that contaminants are not migrating into new areas or areas in which operation of extraction wells has been discontinued at concentrations above the cleanup standards, that systems designed to extract highly contaminated groundwater are operating effectively with respect to design objectives, and that treatment systems are in compliance with specific treatment requirements. The system is also required to document procedures to demonstrate completion of the RA and the 30-year post termination monitoring. In order to

accomplish this, ACC/GCC prepared a Performance Monitoring Evaluation (PME) plan in association with the final RD. The final PME plan is dated November 1993. The ACC/GCC is also required to submit quarterly progress reports to EPA that summarizes the information obtained from the operation, maintenance, and monitoring of the groundwater extraction system. The requirements of this plan as they relate to this five-year review, are briefly summarized as follows:

Startup of Groundwater Extraction Pumping

There are five levels of extraction wells, starting in the shallowest part of the aquifer with those screened in the overburden and ending with those screened in the Lower Hopkinton formation. The startup of the groundwater extraction and treatment system began on December 9, 1994, with the overburden wells being brought online first. The deepest wells, those screened in the Lower Hopkinton formation, were brought online on November 16, 1995. Since this was the last stage of startup, November 16, 1995, is considered the date that the extraction system achieved full startup.

Site-wide Gauging

According to the PME plan, site-wide water level measurements were collected from site-wide monitoring locations prior to each of the five extraction well levels being brought on-line. Once full system startup was achieved, the PME plan required quarterly site-wide gauging. The purpose of the gauging is to verify capture zones and flow directions and to ensure that upward hydraulic gradients are maintained across the Picture Rock formation to prevent downward migration of DNAPL.

Groundwater Monitoring

Sampling and analysis of groundwater from selected monitoring wells, extraction wells, and water supply wells and of surface water from the western unnamed tributary were required as part of the PME plan. The purpose of the groundwater sampling and analysis is to verify performance of the groundwater extraction system and to ensure protection of human health and the environment.

Monitoring of selected wells in five distinct areas of the site (northwest, west, southwest, south, and southeast) is being conducted on an annual basis to ensure capture of the groundwater contamination. The wells are being monitored for VOCs, PAHs, and for the metals antimony, arsenic, and barium. These three metals were selected because ACC/GCC demonstrated that these were the only metals that were of concern at the site.

The water supply wells that are required to be monitored according to the PME plan are the Munck residence well, Pietscher residence well, and Equistar production wells 1, 2, 3, and 6. Monitoring of surface water from the western unnamed tributary is also required by the PME plan. Since finalization of the original PME plan, modifications to the monitoring requirements have been approved by EPA. Table 5 summarizes the original and revised monitoring requirements of the PME plan.

Treatment System Performance Monitoring

Treatment system monitoring is required to characterize system performance and to determine compliance with the following requirements: (1) effluent water from the treatment process must comply with the site-specific NPDES permit, (2) air emissions must be monitored to determine whether the catalytic oxidizer is needed, and (3) filter solids must be monitored to determine disposal requirements.

In order to determine whether the treatment system is operating effectively, samples were collected before and after specific treatment units on a weekly basis until startup of the extraction system, then monthly for five months and quarterly thereafter. Solids are monitored on an as needed basis.

Second Operable Unit

As required by the OU 2 CD, ACC/GCC continues to perform monitoring and inspection tasks in accordance with the O&M Manual dated October 1998. These tasks are as follows:

- Landfill Area
  - Annual inspections of the Landfill cap and access roads
  - Annual inspections of the Landfill surface water management system
  - Quarterly inspections of the Landfill fencing and warnings

- Area H-2
  - Annual inspections of stone and concrete cap
  - Annual inspections of warning sign

- Previous Basin, Former Waste Pile F, and Surface Impoundments B and D
  - Annual inspections of vegetative cover
  - Annual inspections of warning signs

- Areas Adjacent to Polishing Basin
  - Annual inspections of riprap and vegetative cover
  - Annual inspections of warning signs

As outlined in the CD, these tasks will continue to be performed until the inspection period of thirty years is completed.

Operation and Maintenance (O&M) Costs

The following table includes the actual costs of O&M submitted by ACC/GCC compared to the ROD estimates for both OU 1 and OU 2.

Annual O&M Costs

	OU 1 Actual ($)	OU 1 ROD Estimate ($)	OU 2 Actual ($)	OU 2 ROD Estimate ($)	Total OU1 and OU2 Actual ($)
1999	1,432,000	220,000	168,000	33,000	1,600,000
2000	1,432,000	220,000	168,000	33,000	1,600,000
2001	1,501,000	220,000	99,000	33,000	1,600,000
2002	1,632,000	220,000	168,000	33,000	1,800,000
2003	1,816,000	220,000	84,000	33,000	1,900,000

Regarding OU 1, the actual O&M cost is substantially more than estimated in the ROD. Several factors likely contribute to the actual costs being higher. First, the remedy selected in the 1989 ROD only addressed groundwater contamination in the Landfill and DAC areas while these costs are for the site-wide groundwater remedy as modified in the 1991 ESD. The 1989 ROD estimated that approximately 140 gallons per minute (gpm) of extraction capacity would be required as compared to a 565 gpm capacity contemplated by the 1991 CD, a roughly four fold increase. Second, the actual costs as reported by ACC/GCC include some activities which were not included in the 1989 ROD estimate, such as biofouling management, which costs approximately $300,000 per year, additional monitoring and consulting costs. Third, the OU 1 equipment is getting older, which has contributed to higher maintenance costs in the last few years. Finally, inflation likely would be a factor in the difference, since the ROD estimate was done in 1989.

In regard to OU 2, the O&M ROD estimate is also substantially less than the actual expenditures. One of the main reasons for this is that the 1993 ROD estimate assumed a smaller LGE system that would have operated for a longer period of time. However, ACC/GCC designed and built a larger system that operated for a shorter time period. The expenditures for 2001 were less than 1999, 2000, and 2002 because the LGE System was shutdown for a period of time due to blower repairs. In April 2003, the LGE system was permanently shutdown, so the operation was for only part of the year. Since the LGE system is now permanently shutdown, the O&M costs for OU 2 will be substantially less in the future. ACC/GCC representatives estimate that OU 2 O&M costs in the future will be approximately $15,000 per year for maintaining the Landfill Cap and other area vegetative covers and signs.

ACC/GCC has submitted proposals to EPA and IDNR, as discussed in other portions of this document, for a revised remedy that will be protective of human health and the environment but substantially less cost than the present remedy. If such a proposal is implemented, the annual O&M costs would likely be substantially reduced.

V. Progress Since the Last Review

The protectiveness statements in the first Five-Year Review Report were as follows:

> "Based on the evaluation of the information in this five-year review, EPA believes that the RA for Chemplex OU 1 is protective of human health and the environment. Although levels of some of the contaminants of concern in groundwater beyond the POC boundary have increased in some areas as discussed in sections six and eight, no groundwater receptors are currently threatened by the contaminant plume. Groundwater monitoring and gauging as well as treatment component monitoring, as required by the PME plan, will continue to ensure that the plumes of contamination will not impact any drinking water supplies and that any discharges from the treatment plant (i.e., air emissions, NPDES discharge, etc.) will be protective of human health and the environment. "

Regarding OU 2, the first Five-Year Review Report stated that a more thorough review of the OU 2 remedy would be discussed in the next five-year review of the site. Therefore, this five-year review will discuss the OU 2 remedy in more detail.

Status of Recommendations and Follow-up Actions from Last Review

In the first five-year review, there were two recommendations as follows:
(1) Restrictive covenants and access easements were required to be recorded by the Recorder of Deeds. This was to be addressed by ACC/GCC and Equistar, the current property owners.
(2) Increases in PCE and other contaminant concentrations at certain monitoring wells outside of the POC boundary were of concern to EPA. ACC/GCC has been in the process of providing a strategy to address this concern.

Regarding the restrictive covenants, ACC/GCC, the City of Clinton, and the other Settling Defendants were parties to the OU 1 CD that was entered in November 1991. Paragraph 30 of the CD calls for recording by Clinton County of "...(a) restrictive covenants which shall run with their respective parcels and which prohibit the construction, installation, maintenance or use of any wells on the described property for the purpose of extracting water for human drinking purposes or for the irrigation of food or feed crops, provided, however, that such covenants shall not apply to existing wells at the Quantum [now Equistar] facility currently used for potable water; and (b) easements which shall run with their respective parcels and which reserve such access as may be necessary for Settling Defendants to implement their obligations under this Decree."

During preparation of the 1999 Five-Year Review Report, it was discovered that preparation and recording of these covenants had not been completed. ACC/GCC, in cooperation with Equistar and EPA, prepared a "Notice of Environmental Cleanup, Access Easement and Restrictive Covenants" for the chemically-impacted portions of the affected parcels. These restrictive covenants were recorded by the Clinton County Recorder's Office on August 21, 2001. A copy of the restrictive covenant is included as Attachment B. The area

covered by these covenants is the Equistar Plant area, including the Landfill Area and is generally indicated with the enclosed map in Attachment B. The area covered by the restrictive covenants does not include property owned by ACC/GCC that is south of Hawkeye Road. On this property there is some groundwater contamination above the cleanup standards that is outside of the POC boundary. During the next five-year review, EPA will evaluate whether the restrictive covenants should be extended to this area.

In regard to the concern about increasing concentrations of contaminants beyond the POC boundary, EPA, ACC/GCC, and IDNR have had numerous discussions and exchanges of information regarding this issue. The plume, particularly on the east side of the site, has higher concentrations of contaminants and has spread laterally. The agencies and responsible parties are attempting to resolve these issues.

VI. Five-Year Review Process

Administrative Components

ACC/GCC and EPA first discussed the upcoming five-year review at a meeting on February 6, 2003. This meeting was initiated by ACC/GCC, who is in the process of reevaluating the current remedy and developing a proposal for a new remedy. The five-year review was conducted by Nancy Swyers of EPA Region 7, Remedial Project Manager for the Chemplex Site. Other members of the EPA Region staff who contributed to this review include Dan Shiel of the Office of Regional Counsel, Bill Pedicino of the Data Integration and Support Branch, and Mary Grisolano of the RCRA Corrective Action and Permits Branch. CDM Federal Programs, EPA's Response Action Contractor, also conducted reviews of ACC/GCC documents, provided input on the five-year review and collected split samples during the November 2003 sampling event as requested by EPA. Cal Lundberg of the Iowa Department of Natural Resources (IDNR) assisted in the review as the representative of the support agency.

Community Involvement

On March 3, 2004, a notice was placed in the Clinton Herald that a five-year review was to be conducted and provided information on how to contact the EPA to provide input. A fact sheet stating the same, as well as a history of the Site, was sent to the mailing list of 223 on March 1, 2004. The mailing list includes elected officials, members of the media, and community members. The letter invited the recipients to submit any comments they might have to the EPA. No comments have been received. However, as requested by KROS AM Radio, EPA did participate in an interview regarding the site status and five-year review process.

Soon after approval of this Second Five-Year Review Report, a notice will be placed in the same newspaper announcing that the Report is complete, and that it is available to the public at the Clinton and Camanche Public Libraries in Clinton and Camanche, Iowa and the EPA Region VII office.

Document Review

First Operable Unit

This five-year review consisted of a review of relevant documents including quarterly progress reports and annual monitoring reports submitted by ACC/GCC since the last five-year review. As reported by ACC/GCC and indicated in Table 3, more than 23,400 pounds of VOCs have been recovered from the groundwater extraction system through December 2003.

Data Review and Evaluation

Site Operation and Maintenance

In accordance with the OU 1 CD, Earth Tech, ACC/GCC's Operations Contractor for the Groundwater Remediation System, uses the tools listed below to comply with the O&M requirements. These are kept in the control room of the Treatment Building and are the responsibility of the Chief Operator:

1. Draft Operations and Maintenance Manual: This manual, used during system startup in late 1994 and 1995, provides overall guidance for system operation.

2. Manufacturer's Manuals and Standard Operating Procedures: Operation and maintenance procedures issued by equipment manufacturers are followed where available. Standard operating procedures (SOPs) are created as needed to supplement manufacturer information.

3. Preventive Maintenance: The operators maintain a computer program that issues preventive maintenance task orders.

4. Calendar: This program generates reminders for sampling events and other scheduled tasks.

5. Control System Interface: Computer screens, designed to resemble flow schematics and control panels, serve as the operator's interface with the system programmable logic controller. The system also records flowrates and equipment status and run times.

6. Well History Log: This book records well and pump maintenance work to guide future well maintenance needs.

7. Log Sheets: The operators fill out log sheets to record test data, chemical usage, filter run times, and periods of system downtime.

8. Log Book: Documents daily activities.

The Chief Operator writes monthly operating reports, and a quarterly compendium of NPDES monitoring results. The monthly and quarterly reports are included within the quarterly reports submitted to EPA and IDNR.

The OU 1 ROD specified that contaminated groundwater would be treated as necessary in order to ensure that discharge to the Mississippi River from the final treatment system was in compliance with the NPDES permit discharge limitations. IDNR issued the first NPDES permit, which was in effect for a five-year period, effective on June 20, 1994. As discussed in the 1999 Five-Year Review Report, the permit was amended in 1996. The permit was reissued in 1999 and will expire June 3, 2004. ACC/GCC submitted the permit renewal application in December 2003, which is currently under review by IDNR. The code of Iowa provides that an expired permit remains in effect provided that a timely and complete renewal application is filed. Since ACC/GCC filed a timely renewal application, they will be able to continue to operate under their existing permit even if it expires. A summary of the NPDES monitoring since 1999 is included on Table 4. During the five-year period, there have been a few minor exceedances of phenol, which were most recently detected in November 18, 2002. The IDNR Field Office #6 inspected the groundwater extraction and treatment facility in March 2002 and didn't note any problems. The IDNR Field Office #6 does not consider the phenol exceedances, which have not occurred since 2002, to be a problem. Refer to attachment F for information from IDNR.

Groundwater and Surface Water Monitoring

ACC/GCC is required to perform groundwater and surface water monitoring in accordance with the November 1993 PME Plan. Since implementation of this plan, ACC/GCC has proposed modifications and EPA has provided approval on various aspects of this plan. Table 5 summarizes the original and current requirements of the PME Plan. There have not been changes to the monitoring requirements since the 1999 Five-Year Review. Since the last five-year review, ACC/GCC has been required to monitor for VOCs in a number of extraction and monitoring wells as well as the Munck residential well and the Western Unnamed tributary on an annual basis. Metals and PAHs are monitored on a biannual basis.

Table 6 identifies the AOA wells that ACC/GCC is required to sample pursuant to the PME Plan that have concentrations of contaminants that exceeded the cleanup standards during the latest Spring 2003 sampling event. Figures 6 through 11 depict the locations of the all of the monitoring and extraction wells and the concentrations of PCE, the primary contaminant of concern, that have been detected since the groundwater extraction and treatment system has been in operation. Each of the figures depicts a different geologic formation starting with the Overburden and ending with the Blanding.

As indicated on Table 6 and Figures 6 through 11, the results of the annual monitoring indicate that concentrations of VOCs in some of the monitoring wells are still above the cleanup standards outside of the POC. The west region of the site is less problematic than the east region of the site in regard to having areas outside of the POC that exceed cleanup levels. The east region is more problematic than the west region because concentrations of contaminants are higher and more laterally expansive than on the west side.

On the west side of the site, the only wells outside of the POC that exceed the cleanup levels are MW-99A in the Overburden and MW-110B in the Lower Scotch Grove. There is contamination on the west side in the Farmers Creek in wells EW-6b and EW-7b. Both of these wells are within the POC boundary although their close proximity to the POC boundary indicates that there could be contamination in the Farmers Creek formation outside of the POC boundary.

As indicated in Table 6 and figures 6 through 11, there are wells located on the east side of the site beyond the POC boundary that have substantial concentrations above the cleanup standards. Of the most concern are the concentrations of PCE in monitoring wells MW-73-2, MW-112A, and MW-109B in the Lower Scotch Grove and MW-109C in the Farmers Creek formations. All of these wells contain concentrations of PCE in the 100s of µg/l and all have had increases in concentration since the 1999 five-year review. These increases could be the result of contaminant movement caused by the groundwater extraction system. As indicated on Table 6 and Figure 12, concentrations of trichloroethene (TCE) also exceed the cleanup level of 3 µg/l in a number of the compliance wells. In addition to TCE, concentrations of cis 1,2 dichloroethene (DCE), 1,1 DCE, and vinyl chloride have been detected in a number of the site monitoring and extraction wells but not outside of the POC above the cleanup levels.

Table 7 summarizes the results of monitoring conducted of the western unnamed tributary since the last five-year review. The sample is collected at its crossing under 21st Street and analyzed for VOCs and PAHs. As noted in Table 7, PCE was the only analyte detected and it was detected at a concentration of 0.5 µg/l during the last annual sampling event.

In regard to private wells, ACC/GCC is required to sample the Munck residential well and the four Equistar production wells. The Pietscher residential well was abandoned and plugged in 1997. During the latest Spring 2003 sampling event, the only VOCs detected in the Munck well were toluene at a concentration of 0.3 µg/l which is well below the Maximum Contaminant Level (MCL) established by the Safe Drinking Water Act of 1,000 µg/l and Methylene Chloride which was detected at a concentration of 1 µg/l which is below the MCL of 5 µg/l. Methylene chloride is believed to be a laboratory contaminant. From 1999 through 2001, VOCs were not detected in the Munck well. In 2002, toluene was detected at a concentration of 0.4 µg/l, which is below the MCL, and chlorobenzene was also detected at a concentration of 0.4 µg/l. There is no MCL for chlorobenzene. PAHs were not detected in the Munck well from 1999 through 2003.

The Equistar production wells were sampled, according to the PME requirements in 1999, 2001, and 2003. In 1999 the Equistar wells had detectable concentrations of carbon disulfide and methylene chloride, which were believed to be laboratory contaminants. Methylene chloride was also detected in the four Equistar wells in 2001. Table 8 contains the results from the latest Spring 2003 sampling event regarding concentrations of contaminants detected in the Equistar production wells. EPA has been concerned about the contaminants detected in Equistar production well 2. Equistar and ACC/GCC are in the process of addressing this issue.

PAH concentrations measured since the last five-year review are summarized in Table 9. PAHs have not been detected above cleanup levels in any compliance well since the last five-year review. Only one PAH, naphthalene, was detected in any groundwater sample during the latest Spring 2003 sampling event, which is summarized in Table 9a. It was found in samples collected from wells DG-16 and EW-6b, both at concentrations well below the cleanup level of 20 µg/l. As indicated on Table 5, PAH sampling of designated compliance wells is now done once every two years. The next PAH sampling event will occur in the year 2005.

Antimony, arsenic and barium were analyzed in wells set forth in the PME Plan in accordance with EPA's letter to ACC/GCC dated July 19, 1994. Table 10 summarizes the results of metals sampling conducted since the last five-year review and Table 10a summarizes the latest Spring 2003 results. Arsenic had been detected in 1996, 1997, 1998, 1999, and 2001 at approximately 30 µg/l in extraction well LF-6 in the landfill area. Similarly, arsenic was detected at a concentration of 21.6 µg/l in well LF-6 during the Spring 2003 sampling event. These concentrations are above the cleanup standard of 0.03 µg/l. However, this well is within the POC boundary. Barium was detected in several wells, at concentrations below the cleanup level of 2,000 µg/l. Antimony was not detected above the reporting limit of 30 µg/l. The sampling frequency for these metals is now once every two years, with the next metals sampling event scheduled for the year 2005.

In order to allow better evaluation of VOC concentration trends, particularly in the Lower Scotch Grove and Farmers Creek layers, ACC/GCC performed a supplemental groundwater sampling event in November 2003. An EPA representative conducted oversight of the event and collected split samples. Results of this event are contained in the report titled, "Summary of Results from November 2003 Supplemental Groundwater Sampling Event" dated March 26, 2004. In summary, the results of this sampling event were similar to the results of the Spring 2003 sampling event and EPA's split sampling results were of similar concentration to ACC/GCC's results.

EPA also evaluates monitoring of the residential wells in the Clinton County area as conducted by the county in cooperation with the University of Iowa Hygenics Laboratory (UHL). This monitoring is now conducted on a biennial (every two years) basis. The latest 2002 monitoring results are summarized in a letter to Bob Summers, the Clinton County sanitarian, from UHL and included as Attachment C. Although arsenic and TCE, two contaminants that have been detected at the Chemplex Site, have been detected in a couple of the residential wells, the plume of contamination does not extend to these residents. Therefore, the Chemplex Site is not believed to be the source of contamination in the residential wells. Also, the TCE concentrations detected in the residential wells are below the MCL of 5 µg/l and the Chemplex cleanup standard of 3 µg/l. Therefore, the Clinton County monitoring provides further evidence that local residents are not ingesting contaminated groundwater from the site.

Quarterly Groundwater Gauging

As specified in the PME Plan for Chemplex OU 1and discussed in the previous Five-Year Review Report, water-level gauging is required on a quarterly basis, and is used as a guide on the effectiveness of the extraction system to hydraulically control the contaminated groundwater. Locations for gauging, frequency, the date gauging was last completed, and the approximate date of the next event is presented in the quarterly reports.

The quarterly reports, prepared by ACC/GCC on the gauging events, generally include potentiometric surface contour maps depicting the data pertaining to the most recent event. Initially, potentiometric maps for each of two "primary" hydrostratigraphic units were prepared. The primary units were based on the position of the geologic formation relative to the Picture Rock Member, a relatively low-hydraulic conductivity unit that may provide a barrier, or partial

barrier, to the downward vertical movement of DNAPL. The primary units and the corresponding geologic formation or member included in the units are as follows:

Upper Stratigraphic Unit (Picture Rock Member and Above)
Upper Scotch Grove Formation
Lower Scotch Grove Formation
Upper Portion of the Picture Rock Member

Lower Stratigraphic Unit (Below the Picture Rock Member)
Farmers Creek Member
Lower Hopkinton Member
Blanding Formation

Attachment D includes Figures G-1, 2, and 3, which indicate the piezometric surface contours and capture zones for the November 2003 sampling event for the Upper Scotch Grove, Lower Scotch Grove and Farmers Creek formations. The piezometric surface contours were constructed with the water level data coupled with groundwater flow simulation results from the Chemplex 3-D Groundwater Flow Model (3-D Model). An automated contouring program, Surfer v.8.02 was also used in conjunction with the 3-D Model to estimate capture zones. The capture zones as depicted on Figures G-1, 2, and 3 are generally similar to those of previous quarters.

Vertical Groundwater Head Differences

Figures G-4 through G-16 in Attachment D present vertical head differences across the relatively low permeability Picture Rock Formation for several of the monitoring well pairs. The purpose of measuring head differences is to evaluate the potential for DNAPL migration. Figures G-4 through G-9 are for monitoring wells in the west region of the site and Figures G-10 through G-16 are for monitoring wells in the east region of the site. A positive head difference indicates an upward vertical gradient while a negative head difference indicates a downward vertical gradient. A negative vertical gradient can increase the potential for contamination to migrate downward. In summary, the most recent vertical heads measured in the monitoring well pairs in the west region as indicated in Figures G-4 through G-9 indicate either a slightly negative to slightly positive vertical gradient, ranging from -0.25 to 1.75. The vertical heads measured in the east region as indicated on Figures G-10 through G-16 indicate downward vertical gradients, ranging from approximately -1.8 to -10.3. The downward vertical gradients in the east region could explain the increase in PCE concentrations observed in the Lower Scotch Grove and Farmers Creek monitoring wells. It appears that operation of the extraction system may be worsening the downward gradients on the east side.

Figures G-17 through G-21 present vertical head differences between the lower Farmers Creek and Lower Hopkinton formation. As indicated on Figures G-17 and G-18, vertical head differences are close to zero. Figures G-19 through G-21 in the east region also indicate positive vertical head differences.

The suspension of operation of extraction in the Lower Hopkinton formation approved by EPA in March 1999 appears to have lessened downward hydraulic gradients across the Picture Rock formation.

Second Operable Unit

This five-year review of OU 2 consisted of a review of relevant documents including quarterly progress reports, the O&M Plan, and the Final Construction Completion Report. As reported by ACC/GCC and indicated in Figure 13, approximately 33,000 pounds of Target Compounds were removed by the LGE System from the startup of operation in 1998 until the time-based shutoff criteria was met in 2003. Masses of extracted compounds were calculated in each OU 2 quarterly report. As shown on Figure 13, the rate of VOC mass removal by the LGE system greatly decreased over time. This decrease occurred even though the LGE System vacuum extraction flowrate remained steady, indicating that most of the VOC mass that was feasible to extract was extracted early in the operation period.

Site Inspection

An inspection of the Site was conducted on October 1, 2003 by Nancy Swyers. The purpose of the inspection was to assess the protectiveness of the remedy, including the integrity of the landfill cap and the operation of the groundwater extraction and treatment system. A photographic log of the site is included as Attachment E. The cap was observed to be in good condition and the plant was in full operation.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The review of site documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the results of the site inspection indicates that the remedy is partially functioning as intended by the ROD. One of the major remedial action objectives of the OU 1 ROD was to extract groundwater such that the cleanup standards specified in the CD are met downgradient of the POC. Although a significant effort has been expended to extract and treat groundwater, concentrations of VOCs have increased significantly downgradient of the POC in the east area. ACC/GCC has been effective in keeping the groundwater extraction and treatment system in operation and maintaining the integrity of the cap. However, the costs of O&M are greater than anticipated. Some of the major differences between the O&M costs estimated in the ROD and the actual O&M costs were due to the design and construction of the groundwater extraction and treatment system being larger than anticipated in the 1989 ROD. Other differences are due to frequent fouling of the extraction wells and more frequent monitoring.

Optimization of the groundwater extraction and treatment system has been discussed and evaluated by ACC/GCC and EPA. In 2002, ACC/GCC discussed the possibility of placing two additional extraction wells on the east side upgradient of the POC. However, given that the DNAPL which is a source of contamination of the contaminant plume, is impracticable to remove or treat and the fractured bedrock hydrogeology, it is debatable whether the two additional extraction wells would be effective in containing the plume.

The OU 1 groundwater treatment system is effective in treating the contaminated groundwater. There have been only minor NPDES exceedances since the last five-year review. In regard to the OU 2 RA, the LGE System was effective in reducing contaminated vapor

concentrations in the landfill to the extent practicable which has helped to some extent the contaminant migration to groundwater.

The institutional controls as required by the CD have been implemented. There has been plume migration, particularly on the east side of the site. Fortunately, the plume is relatively well defined by the monitoring system. Also, based on monitoring being conducted by ACC/GCC of the Munck residential well and by the UHL of the Clinton County wells, it is believed that there are no receptors drinking water above health-based standards established by the SDWA from the site. Therefore, the site remedy remains protective.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

There have been no changes in physical conditions or land use at the Site that would affect the protectiveness of the remedy. Also, due to site operational history, no new chemicals of concern are expected or have been detected.

Changes in Standards and To Be Considereds

For contaminants of concern at this Site, the ARARs established in the 1989 OU 1 ROD and updated in the 1999 Five-Year Review Report remain protective of human health and the environment.

In regard to the groundwater cleanup standards, Tables 1a and 1b are from the 1999 Five-Year Review Report. Table 1a lists the COCs in the groundwater and the cleanup standards that were to be met downgradient of the POC for the COCs. The 1999 Five-Year Review explained in detail how the cleanup standards were arrived during the 1991 CD and how they were modified prior to the 1999 Five-Year Review. Table 1b summarizes the COCs and corresponding revised cleanup standards for PCE and styrene. In summary, the cleanup standards are based on Chapter 133 of the Iowa Administrative Code and the EPA Safe Drinking Water Act. The cleanup standard for PCE was modified from 0.7 µg/l to 5 µg/l based on a petition by ACC/GCC, pursuant to the CD, that was approved by IDNR. The cleanup standard for styrene was established at 100 µg/l because it was determined to not be a carcinogen.

Review of the 2004 Edition of the Drinking Water Standards and Health Advisories indicates that a number of the COCs have revised standards since the last five-year review. Table 1c compares the CD Cleanup Standards compared to the 2004 standards. As indicated on Table 1c, the Negligible Risk Level at the 10^{-6} Cancer Risk (NRL) for 1,1-DCE is now 0.06 µg/l instead of the Lifetime Health Advisory Level (HAL) of 7 µg/l; the NRL for vinyl chloride is now 0.02 µg/l instead of 0.015 µg/l ; benzo(a) pyrene (BAP) now has a NRL of 0.005 µg/l, naphthalene now has a HAL of 100 µg/l, antimony now has a HAL of 6 µg/l instead of 3 µg/l, arsenic has an MCL of 10 µg/l, beryllium has an MCL of 4 µg/l, and lead has an action level of 15 µg/l . Of these compounds that now have different 2004 standards than the CD, the VOCs are toluene, 1,1 DCE, and vinyl chloride. As indicated on Figure 12 of this report, none of these VOCs have been detected outside of the POC. Also, the NRL for vinyl chloride is actually somewhat higher at 0.02 µg/l than the CD cleanup standard. Therefore, the fact that the 2004 standards are different for toluene, 1,1 DCE and vinyl chloride does not affect the protectiveness of the remedy. In regard to the PAH standards, the 2004 standards for benzo(a)pyrene and

naphthalene are different than those established pursuant to the CD. However, the 2004 naphthalene HAL is actually higher than the HAL established during the CD. The benzo(a)pyrene NRL is now 0.005 µg/l which, according to a Region 7 chemist, is not achievable to detect by approved drinking water standards. In regard to the PAH monitoring, refer to Table 9 which summarizes the detections of PAHs in the monitoring wells in the last five years and Table 9a, which specifically identifies which wells had PAH detections in 2003. According to Table 9, there have been very few detections of PAH compounds. According to Table 9a, the only detectable PAH was naphthalene in wells DG-16 at a concentration of 0.12 µg/l and EW-6c at a concentration of 0.405 µg/l. These concentrations do not exceed the PAH standards for naphthalene. Therefore, the fact that there are different 2004 standards for naphthalene and benzo(a)pyrene do not affect the protectiveness of the remedy. In regard to metals, only antimony, arsenic, and barium were determined to not be naturally occurring. Of those metals, there have been changes to the 2004 standards for antimony and arsenic. However, in both cases, the 2004 standards are higher than the standards established during the CD. Therefore, the 2004 standards do not affect the protectiveness of the remedy for metals. In summary, the 2004 standards for the COCs at the Chemplex site do not call into question the protectiveness of the remedy and there is no reason to modify the groundwater cleanup standards.

Air emissions must be in compliance with 40 C.F.R. 265, Subpart AA. As discussed in detail in the 1999 Five-Year Review Report, ACC/GCC was able to demonstrate to EPA that the catalytic oxidizer (catox) was not required based on the regulatory statutes for the VOC and BNA air stripping towers for the OU 1 groundwater treatment system. In summary, ACC/GCC calculated that the organic concentration in the two towers was less than the regulatory 20 part per million weight (ppmw) and that the estimated organic chemical emissions were less than 3.1 tons per year. At EPA's request, ACC/GCC also calculated the risk based on the 1999 emissions and determined that the upper-bound incremental risk was estimated to be 1.2×10^{-6}. Since the catox was not needed for the OU 1 treatment system, it was used to treat emissions from the OU 2 LGE system. The OU 2 LGE system ceased operation in April 2003. ACC/GCC has continued to monitor the OU 1 untreated emissions and has continued to demonstrate, as reported in the quarterly progress reports that the catox is not needed to treat emissions. Figure 14 depicts the total VOC emissions in tons per year from the BNA and VOC towers from 1999 until 2003. As indicated on Figure 14, the total combined emissions from the two towers are 1.22 tons in 1999, 1.42 tons in 2000, 0.82 tons in 2001, 0.66 tons in 2002, and 0.83 tons in 2003. All of these quantities are well below the 3.1 tons per year emission requirements of 40 C.F.R. 265 Subpart AA. EPA again asked ACC/GCC to calculate the risk based on the 2000 emissions since the 2000 emissions are higher than the 1999 emissions. ACC/GCC calculated the risk based on both the current TCE carcinogenic slope factor and the draft TCE slope factor. With the current slope factor, the carcinogenic risk was 9.7×10^{-7}. With the draft slope factor, the risk was determined to be 1.1×10^{-6}. Both risks were determined to be within the acceptable risk range. At EPA's request, ACC/GCC's methodology was reviewed by a CDM risk assessor and determined to be acceptable. Refer to Attachment G for ACC/GCC's calculations and CDM's Email to EPA.

Regarding solid/hazardous waste disposal, as discussed in the 1999 Five-Year Review Report, treatment, storage, and disposal of solid wastes from the OU 1 treatment system must comply with Subtitle C and D of RCRA. The spent carbon was determined to be a listed hazardous waste and is manifested and treated in a permitted activation furnace. The sludge has been sent to the Equistar treatment plant for disposal.

Changes in Exposure Pathways, Toxicity, and other Contaminant Characteristics

As discussed in the 1999 Five-Year Review Report, risk assessments were conducted during both the OU 1 and OU 2 Remedial Investigations and summarized in the RODs. Based on the OU 1 risk evaluation, it was determined that both noncarcinogenic risks and excess lifetime cancer risks from exposure to the contaminants in the onsite groundwater would be unacceptable. Noncarcinogenic and carcinogenic risks were considered in the acceptable risk range for worker's exposure to surface soils and for children's exposure to surface water. The baseline risk assessment for OU 2 further evaluated potential risks from exposure to contaminated soils and wastes. The conclusion of the OU 2 risk assessment was that the potential risks from exposure to the soils and wastes were within the acceptable range of 10^{-4} to 10^{-6}. Existing conditions at the site were also determined to be protective of ecological receptors. Operation of the LGE System likely reduced soil and concentrations to make them even more protective. The assumptions in the risk assessments are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup standards. No change to these assumptions or the cleanup standards developed from them is warranted.

As part of the OU 2 RA, the Landfill Area and the H-2 Area of the DAC Storage and Loading Area have been capped. In all of the other areas, vegetative covers are being maintained and institutional controls have been implemented. Therefore, any potential direct contact exposure to the soils and wastes has been eliminated. The OU 2 LGE System was also effective in reducing contaminant in the Landfill vapors to the extent practicable. The OU 1 groundwater monitoring system has been effective in determining that no receptors are being exposed to unsafe concentrations of contaminants from the groundwater contaminant plume.

Evaluation of Remedial Action Objectives (RAOs)

The RAOs established during the OU 1 and OU 2 RODs are still valid in regard to protection of Rock Creek, drinking water receptors, and onsite workers or trespassers. The RAOs have been met with the exception of contaminated groundwater that has higher concentration than the cleanup standards outside of the POC. As discussed earlier, ACC/GCC and EPA are working to resolve this issue.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No new targets have been identified during the five-year review. There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed and the site inspection, the remedy is largely functioning as intended by the ROD, as modified by the ESD. As discussed earlier, the overall O&M of the site is occurring but there are areas downgradient of the POC where the groundwater concentrations exceed the cleanup standards and are in fact, increasing in concentration. There have been no changes to the physical conditions of the Site that would affect the protectiveness of the remedy. With the exception of the groundwater concentrations downgradient of the POC,

the ARARs cited in the RODs are being complied with. Soils and wastes at the site have been addressed by a combination of LGE, capping, maintenance of vegetative covers, and institutional controls. Although the contaminant plume is, in some areas, outside of the POC boundary, no exposure to contaminated media is occurring. There have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

VIII. Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Contaminant Plume Outside the Boundary of the POC	N	Y
Contamination in Equistar Well	N	Y

IX. Recommendations and Follow-up Actions

For all of the recommendations and follow-up actions listed in the following table ACC/GCC is the party responsible for implementing the actions and the EPA is the oversight agency. The IDNR will be involved with future activities at the Site.

Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Milestone Date	Affects Protectiveness (Y/N)	
			Current	Future
Contamination beyond the POC	ACC/GCC needs to address and submit plan	07/04	N	Y
Outstanding EPA April 23, 2004 letter regarding revised remedy and POC contamination	ACC/GCC needs to submit response and meet with EPA	06/04	N	Y
Future groundwater monitoring	ACC/GCC needs to submit plan in conjunction with other plans and meet with EPA	07/04	N	Y

Issue	Recommendations and Follow-up Actions	Milestone Date	Affects Protectiveness (Y/N)	
			Current	Future
PRPs, property owners, agencies coordination	Need to have coordination between all parties. May need initial meeting and communication as necessary	08/04	N	Y
Contamination in Equistar Well	ACC/GCC and Equistar need to propose a strategy to resolve the contamination.	06/04	N	Y

X. Protectiveness Statement

The remedy at the Chemplex site is protective of human health and the environment.

XI. Next Review

The next five-year review for the Chemplex Superfund site is required in June 2009, five years from the date of this review.

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Figures

Tables

TABLE 1a

GROUNDWATER CLEANUP STANDARDS ESTABLISHED IN THE CONSENT DECREE

COMPOUND	*CONCENTRATION (UG/L)*	
ORGANICS		
Benzene	*1*	*(NRL)*
Toluene	*2000*	*(HAL)*
Ethylbenzene	*700*	*(HAL)*
Xylenes	*10,000*	*(HAL)*
Tetrachloroethylene	*0.7*	*(NRL)*
Trichloroethylene	*3*	*(NRL)*
1,1-Dichloroethylene	*7*	*(HAL)*
1,2-Dichloroethylene	*70*	*(HAL)*
Methylene Chloride (Dichloromethane)	*5*	*(NRL)*
1,1,2,2-Tetrachloroethane	*0.2*	*(NRL)*
1,1,1-Trichloroethane	*200*	*(HAL)*
Vinyl Chloride	*0.015*	*(NRL)*
Styrene	*100 or 0.01*[b]	
1,2-Dichlorobenzene	*600*	*(HAL)*
Benzo(a)anthracene (PAH)	*0.1*	*(PMCL)*[c]
Benzo(a)pyrene (PAH)	*0.2*	*(PMCL)*[c]
Benzo(k)fluoranthene (PAH)	*0.2*	*(PMCL)*[c]
Chrysene (PAH)	*0.2*	*(PMCL)*[c]
Naphthalene	*20*[d]	
METALS[e]		
Antimony	*3*	*(HAL)*
Arsenic	*0.03*	*(NRL)*
Beryllium	*0.007*	*(NRL)*
Cadmium	*5*	*(HAL)*
Chromium	*100*	*(HAL)*
Lead	*50*	*(MCL)*
Nickel	*100*	*(HAL)*

[a] Standards as listed in the CD SOW, Section III.

[b] At the time of the CD, EPA had not yet decided whether to classify styrene as a carcinogen or non-carcinogen. For a carcinogen, the cleanup standard would be .01. For a non-carcinogen, the cleanup standard would be 100.

[c] The cleanup standard for these compounds are presently set at the level of the proposed MCLs. The cleanup standard for these compounds will be amended to conform to final MCLs when final MCLs are established.

[d] Naphthalene is a surrogate for acenaphthene, acenaphthalene, anthracene, fluorene, fluoranthene, 2-methylnaphthalene, phenanthrene, and pyrene.

[e] Metals concentration limits if not naturally occurring.

TABLE 1b

REVISED GROUNDWATER CLEANUP STANDARDS[a]

COMPOUND	*CONCENTRATION (UG/L)*	
ORGANICS		
Benzene	*1*	*(NRL)*
Toluene	*1000*	*(HAL)*
Ethylbenzene	*700*	*(HAL)*
Xylenes	*10,000*	*(HAL)*
Tetrachloroethylene	*5*	*(MCL)*
Trichloroethylene	*3*	*(NRL)*
1,1-Dichloroethylene	*7*	*(HAL)*
1,2-Dichloroethylene	*70*	*(HAL)*
Methylene Chloride (Dichloromethane)	*5*	*(NRL)*
1,1,2,2-Tetrachloroethane	*0.2*	*(NRL)*
1,1,1-Trichloroethane	*200*	*(HAL)*
Vinyl Chloride	*0.015*	*(NRL)*
Styrene	*100*	*(HAL)*
1,2-Dichlorobenzene	*600*	*(HAL)*
Benzo(a)anthracene (PAH)		
Benzo(a)pyrene (PAH)	*0.2*	*(MCL)*
Benzo(k)fluoranthene (PAH)		
Chrysene (PAH)		
Naphthalene	*20[b]*	*(HAL)*
METALS[c]		
Antimony	*3*	*(HAL)*
Arsenic	*0.03*	*(NRL)*
Barium	*2,000*	*(HAL)*
Beryllium	*0.007*	*(NRL)*
Cadmium	*5*	*(HAL)*
Chromium	*100*	*(HAL)*
Lead	*50*	*(MCL)*
Nickel	*100*	*(HAL)*

[a] Standards revised as of October, 1996.

[b] Naphthalene is a surrogate for acenaphthene, acenaphthalene, anthracene, fluorene, fluoranthene, 2-methylnaphthalene, phenanthrene, and pyrene.

[c] Metals concentration limits if not naturally occurring.

Table 1c
GROUNDWATER CLEANUP STANDARDS vs. STANDARDS as of 2004

Compound	CD Cleanup Standard[1]	Concentration (µg/l)	Standard as of 2004[6]	Concentration (µg/l)
Benzene	NRL	1		
Toluene	HAL	2,000	HAL	1,000
Ethylbenzene	HAL	700		
Xylenes	HAL	10,000		
PCE[2]	MCL	5		
TCE	NRL	3		
1,1-DCE	HAL	7	NRL	0.06
1,2-DCE	HAL	70		
Methylene Chloride	NRL	5		
1,1,2,2-PCA	NRL	0.2		
1,1,1-TCA	HAL	200		
Vinyl Chloride	NRL	0.015	NRL	0.02
Styrene[3]	HAL	100		
1,2-Dichlorobenzene	HAL	600		
Benzo(a)anthracene[4]				
Benzo(a)pyrene[4]	MCL	0.2	NRL	0.005
Benzo(k)fluoranthene[4]				
Chrysene[4]				
Naphthalene	HAL	20	HAL	100
Antimony[5]	HAL	3	HAL	6
Arsenic[5]	NRL	0.03	MCL	10
Barium[5]	HAL	2,000		
Beryllium[5]	NRL	0.007	MCL	4
Cadmium[5]	HAL	5		
Chromium[5]	HAL	100		
Lead[5]	MCL	50	Action Level	15
Nickel[5]	HAL	100		

Table 1c (continued)

[1]The cleanup standards for PCE, styrene, and PAHs changed from the time of the 1991 CD until the 1999 Five-Year Review. This is discussed in more detail in the 1999 Five-Year Review Report.

[2]The cleanup standard for PCE changed from 0.7 µg/l during the CD to 5 µg/l at the time of the 1999 Five-Year Review.

[3]The cleanup standard for styrene become 100 µg/l because it was determined to not be a carcinogen.

[4]The cleanup standard for these PAH compounds became the final MCL which was established at 0.2 µg/l for benzo(a)pyrene.

[5]Based on information submitted by ACC/GCC, EPA believes that antimony, arsenic, and barium are the only metals that are not naturally occurring.

[6]From the U.S. EPA 2004 Edition of the Drinking Water Standards and Health Advisories

PCE = Tetrachloroethylene or Tetrachloroethene
TCE = Trichloroethylene or Trichloroethene
DCE = Dichloroethylene or Dichloroethene
PCA = Tetrachloroethane
TCA = Trichloroethane

TABLE 1d

Comparison of Recorded Cumulative Monthly Flowrates

Chemplex Site - First Operable Unit

Clinton, Iowa

COMPARISON OF LIFT STATION FLOWS WITH INDIVIDUAL WELL FLOWS				
Well or Stream ID	Flow (gallons)			Overall Well Status
	January	February	March	
DAC-3	31,460	18,600	32,360	On-line
DAC-4	28,200	26,190	27,260	On-line
DAC-5	60	20	0	On-line
DAC-6	34,680	30,740	33,840	On-line
EW-12a	373,500	344,950	351,250	On-line
Total - DAC B Wells	**467,900**	**420,500**	**444,710**	
DAC B Lift Station	**439,800**	**409,700**	**453,700**	
% Difference	**-6%**	**-3%**	**+2%**	
EW-14a	440,550	447,260	461,780	On-line
EW-14b	52,250	53,360	57,550	On-line
EW-14c	0	280	280	Off-line since March 1999 due to induced downward gradients
EW-15a	542,690	499,270	469,560	On-line
EW-15b	129,680	127,570	126,070	On-line
EW-15c	0	270	300	Off-line since March 1999 due to induced downward gradients
EW-16a	867,790	802,690	825,620	On-line
EW-16b	34,720	34,180	38,410	On-line
EW-16c	0	140	160	Off-line since March 1999 due to induced downward gradients
EW-17a	267,310	246,730	255,970	On-line
EW-18a	161,700	227,640	202,110	On-line
EW-19a	215,400	191,450	200,140	On-line
EW-20a	445,290	348,620	482,540	On-line
Total - East V Wells	**3,157,580**	**2,979,460**	**3,120,490**	
East V Lift Station	**3,542,700**	**3,313,100**	**3,489,600**	
% Difference	**+12%**	**+11%**	**+12%**	

TABLE 1d

Comparison of Recorded Cumulative Monthly Flowrates

Chemplex Site - First Operable Unit

Clinton, Iowa

COMPARISON OF LIFT STATION FLOWS WITH INDIVIDUAL WELL FLOWS (CONTINUED)				
Well or Stream ID	Flow (gallons)			Overall Well Status
	January	February	March	
DAC-1	537,340	495,750	496,520	On-line
DAC-2	0	0	0	Permanently shut down due to excessive silting
EW-7a	413,720	421,270	427,250	On-line
EW-7b	69,300	35,880	65,150	On-line
EW-7c	0	340	340	Off-line since March 1999 due to induced downward gradients
PB-1	257,650	265,680	154,050	On-line
PB-2	256,620	212,860	218,600	On-line
PT/RW-1	250,940	92,470	316,460	On-line
Total - South B Wells	**1,785,570**	**1,524,250**	**1,678,370**	
South B Lift Station	**1,956,300**	**1,676,600**	**1,837,400**	
% Difference	**+10%**	**+10%**	**+9%**	
EW-8a	300,470	277,130	284,010	On-line
EW-9a	830,790	774,890	778,770	On-line
EW-10a	491,330	445,150	469,220	On-line
EW-11a	225,050	243,430	307,880	On-line
EW-11b	43,610	32,160	61,410	On-line
EW-11c	0	260	270	Off-line since March 1999 due to induced downward gradients
EW-13a	357,130	329,480	343,240	On-line
EW-13b	0	340	370	Off-line since June 2002 due to induced downward gradients
EW-13c	0	300	340	Off-line since March 1999 due to induced downward gradients
Total - South V Wells	**2,248,380**	**2,103,140**	**2,245,510**	
South V Lift Station	**2,277,600**	**2,130,200**	**2,272,700**	
% Difference	**+1%**	**+1%**	**+1%**	

TABLE 1d

Comparison of Recorded Cumulative Monthly Flowrates

Chemplex Site - First Operable Unit

Clinton, Iowa

COMPARISON OF LIFT STATION FLOWS WITH INDIVIDUAL WELL FLOWS (CONTINUED)				
Well or Stream ID	Flow (gallons)			Overall Well Status
	January	February	March	
EW-1a	215,680	334,270	331,800	On-line
EW-2a	383,800	346,310	371,170	On-line
EW-3a	375,600	341,320	379,980	On-line
EW-21a	212,720	298,160	317,810	On-line
LF-1	198,380	173,710	171,190	On-line
LF-2	388,160	391,910	421,310	On-line
LF-3	322,210	310,700	398,500	On-line
LF-4	181,650	172,580	180,810	On-line
LF-5	200,140	154,730	213,070	On-line
LF-6	192,810	222,230	246,640	On-line
LF-7	242,070	256,180	264,500	On-line
Total - West B Wells	**2,913,220**	**3,002,100**	**3,296,780**	
West B Lift Station	**2,940,600**	**2,996,400**	**3,294,100**	
% Difference	**+1%**	**-0%**	**-0%**	

TABLE 1d

Comparison of Recorded Cumulative Monthly Flowrates

Chemplex Site - First Operable Unit

Clinton, Iowa

COMPARISON OF WELL AND LIFT STATION FLOWS WITH COMBINED INFLUENT FLOWS				
Well or Stream ID	Flow (gallons)			Overall Well Status
	January	February	March	
EW-4a	607,930	735,380	765,990	On-line
EW-5a	756,870	775,460	804,550	On-line
EW-6a	405,960	318,030	507,450	On-line
EW-6b	45,460	49,430	76,950	On-line
EW-6c	0	320	250	Off-line since March 1999 due to induced downward gradients
Total - Other Wells (Note 1)	**1,816,220**	**1,878,620**	**2,155,190**	
TOTAL - ALL WELLS (Note 2)	**12,388,870**	**11,908,070**	**12,941,050**	
TOTAL - TREATMENT PLANT INFLUENT (Note 3)	**13,161,600**	**12,657,500**	**13,716,700**	
% DIFFERENCE	**+6%**	**+6%**	**+6%**	
TOTAL - ALL STREAMS TO TREATMENT PLANT (Note 4)	**12,973,220**	**12,404,620**	**13,502,690**	
TOTAL - TREATMENT PLANT INFLUENT	**13,161,600**	**12,657,500**	**13,716,700**	
% DIFFERENCE	**+1%**	**+2%**	**+2%**	

Notes:

(1) These five extraction wells discharge directly to the Treatment Building without connection to the intermediate Lift Stations.
(2) Calculated as the sum of recorded individual flows from all active extraction wells.
(3) Calculated as the sum of the BNA Stream and VOC Stream influent groundwater flows.
(4) Calculated as the flows from the five Lift Stations plus the flows from the five "Other Wells" described in Note 1.

TABLE 2
Cumulative Active and Inactive Times for LGE Wells Through Shutdown

Chemplex Site - Second Operable Unit
Clinton, Iowa

Well ID	Active Time (yrs) (4)	Inactive Time (yrs) (1)	Average Cumulative Active Time (yrs) (2)
LGE-34 (3)	**2.84**	**1.23**	-
LGE-35	4.07	0.00	4.07
LGE-36	4.07	0.00	4.07
LGE-37	4.06	0.01	4.06
LGE-38 (3)	**3.27**	**0.80**	-
LGE-39	4.07	0.00	4.07
LGE-40	4.07	0.00	4.07
LGE-41	4.07	0.00	4.07
LGE-42	4.07	0.00	4.07
LGE-43 (3)	**2.30**	**1.77**	-
LGE-44	4.07	0.00	4.07
LGE-45	4.06	0.01	4.06
LGE-46 (3)	**2.09**	**1.98**	-
LGE-47 (3)	**2.29**	**1.78**	-
LGE-48 (3)	**2.48**	**1.59**	-
LGE-49	3.98	0.09	3.98
LGE-50	4.07	0.00	4.07
LGE-51	4.07	0.00	4.07
LGE-52	4.07	0.00	4.07
LGE-53 (3)	**1.50**	**2.57**	-
LGE-54	4.07	0.00	4.07
LGE-55 (3)	**1.54**	**2.53**	-
AVERAGE			4.03

Notes:

(1) Inactive time was calculated for each LGE well by subtracting its active time to date from the maximum time any single time a well has been active (4.07 years as of the shutdown date of 9 April 2003).

(2) Progress towards achievement of the four year shutdown criterion was calculated based on the average cumulative active time for the LGE system as described in a letter dated 31 January 2002 from EKI to USEPA and approved by EPA in a letter dated 7 March 2002.

(3) Wells with inactive times greater than or equal to 0.33 years are considered to be "intermittently active" and are not included in the calculation of average cumulative active time for the LGE System as described in the 31 January 2002 EKI letter. These wells are shown in **bold** type. All such wells inactive during this reporting period contained a measurable vacuum induced by neighboring active wells. Periods of inactivity were largely due either to the presence of a significant LNAPL layer or perched water in the screened interval.

(4) Active time calculated through shutdown of LGE system on 9 April 2003.

Abbreviations:
yrs = years

TABLE 3

Masses of Volatile Organic Compounds Recovered via Groundwater Extraction through December 2003

Chemplex Site - First Operable Unit

Clinton, Iowa

Compound	VOC Stream Total	BNA Stream Total	Cumulative Mass Recovered Since System Startup (pounds)
Tetrachloroethene	1,959	14,115	16,074
1,2-Dichloroethene	775	2,156	2,931
Benzene	1.0	2,071	2,072
Trichloroethene	168	1,471	1,638
Vinyl Chloride	25.2	174	200
Toluene	2.0	135	137
Total Xylenes	0.0	91.8	91.8
1,1,1-Trichloroethane	7.7	32.8	40.5
Ethylbenzene	0.0	40.1	40.1
1,1-Dichloroethene	11.3	21.4	32.7
1,1,2-Trichloroethane	0.0	25.6	25.6
Chlorobenzene	0.0	24.9	24.9
1,1-Dichloroethane	8.1	13.9	22.0
Dibromochloromethane	0.1	20.5	20.6
Trichlorofluoromethane	15.6	0.2	15.8
Chloromethane	0.0	13.4	13.4
Chloroform	3.0	6.0	9.1
Chloroethane	6.8	0.0	6.8
Styrene	0.0	6.0	6.0
Bromomethane	0.0	3.2	3.2
Bromoform	0.0	2.8	2.8
2-Hexanone	0.6	1.7	2.4
Carbon disulfide	1.4	0.5	1.9
Carbon tetrachloride	0.0	1.4	1.4
1,2-Dichloroethane	0.0	0.7	0.7
Bromodichloromethane	0.2	0.3	0.5
4-Methyl-2-Pentanone	0.0	0.5	0.5
1,2-Dichloropropane	0.0	0.2	0.2
Total of Volatile Organic Compounds			**23,414**

Table 4

Summary of Analytes Detected in Treated Groundwater

Chemplex Site, Clinton, Iowa

Sampling Date	Analyte	Detected Concentration (ug/L)	Permitted Daily Maximum Concentration (ug/L)	Exceedance of NPDES Permit Effluent Limitation?
11 January 1999	1,2-Dichloroethene	1 J[1]	5	No
12 May 1999	Cis-1,2-dichloroethene ("cis-1,2 DCE")	4 J	5	No
	Tetrachloroethene ("PCE")	2 J	5	No
21 July 1999	Bis(2-ethylhexyl)phthalate	1 J	None Established	No
	Methylene chloride	2 J	5	No
	Cis-1,2 DCE	2 J	5	No
	PCE	2 J	5	No
26 October 2000	Cis-1,2-DCE	3 J	5	No
	PCE	2 J	8	No
15 February 2000	PCE	4 J	5	No
11 May 2000	No detections			
8 September 2000	No detections			
20 November 2000	No detections			
29 January 2001	Bis(2-ethylhexyl)phthalate	8 J	None established	No
	Cis-1,2-DCE	1 J	5	No
	Bromodichloromethane	1 J	5	No
	Naphthalene	0.092 J	7.25	No
26 April 2001	Phenol	0.53 J	1	No
	PCE	4 J	5	No
11 September 2001 and 2 October 2001[2]	Trans-1,2-dichloroethene	3.6 and <1	5	No
	Bromodichloromethane	4.7 and <1	5	No
	Trichloroethene	2.7 and <1	5	No
	PCE	7.5 J and <1[2]	5	Unconfirmed
	Toluene	6 J and <1[2]	5	Unconfirmed
	Ethylbenzene	<1 and 1	5	No
	Xylenes	<1 and 1	5	No
15 November 2001	No detections			
29 January 2002	**Phenol**	**3 J[3]**	**1**	**Yes**
	Bromodichloromethane	4 J	5	No
	PCE	3 J	5	No
	Naphthalene	0.101	7.25	No
16 April 2002	**Phenol**	**2.0 J[4]**	1	**Yes**

Table 4
Summary of Analytes Detected in Treated Groundwater
Chemplex Site, Clinton, Iowa

Sampling Date	Analyte	Detected Concentration (ug/L)	Permitted Daily Maximum Concentration (ug/L)	Exceedance of NPDES Permit Effluent Limitation?
	Naphthalene	0.249	7.25	No
22 July 2002	PCE	3 J	5	No
	Naphthalene	0.14 J	7.25	No
18 November 2002	**Phenol**	**1.27 J**[3]	1	**Yes**
	Naphthalene	0.94	7.25	No
21 January 2003	Phenol	0.547 J	1	No
	Cis-1,2-DCE	1 J	5	No
16 April 2003	Bis(2-ethylhexyl)phthalate	3 J	None established	No
	Methylene chloride	2 J	5	No
	Cis-1,2-DCE	2 J	5	No
	Bromodichloromethane	0.9 J	None established	No
30 July 2003	Cis-1,2-DCE	2 J	5	No
	Bromodichloromethane	1 J	None established	No
	Bis(2-ethylhexyl)phthalate	7 J	None established	No
	Cis-1,2-DCE	3 J	5	No
	Bromodichloromethane	1 J	None established	No
	PCE	1 J	5	No
	Naphthalene	0.262	7.25	No
	Fluorene	0.0386 J	1.35	No
	Indeno(1,2,3-cd)pyrene	0.0254 J	2	No
12 January 2004	Cis-1,2-DCE	2 J	5	No
	Bromodichloromethane	1 J	None established	No
	PCE	2 J	5	No
	Naphthalene	0.192 J	7.25	No
	Fluorene	0.0792 J	1.35	No

Notes:

[1] A "J" qualifier flag indicates the analyte was detected at the concentration shown, and the detected value was less than the laboratory method detection limit, but greater than the laboratory practical quantitation limit. The value shown is thus an estimated concentration.

[2] The sample collected on 11 September 2001 was sent by overnight express mail from the Chemplex site to the analytical laboratory. Air traffic was grounded on 11 September 2001; consequently, the sample did not reach the laboratory overnight in accordance with project protocols. Two of the analytes, PCE and toluene, detected in the September 11 sample were above the Permitted Daily Maximum Concentration. To further evaluate these values, a second sample was collected on 2 October 2001. In this sample, PCE and toluene were less than the laboratory reporting limit of 1 ug/L. The results from the samples collected on 11 September and on 2 October are both shown. Because the September 11 values could not be confirmed, the permitted effluent limitations were considered not to have been exceeded.

Table 4
Summary of Analytes Detected in Treated Groundwater
Chemplex Site, Clinton, Iowa

[3] Detected phenol concentration are as reported by EPA Method 604. According to discussions with the analytical laboratory, EPA Method 604 has a tendency to report false positives under certain conditions. When analyzed under the more reliable EPA Method 8270, phenol was not detected in these samples.

[4] Phenol was detected in the final effluent in a repeated sampling event on 15 May 2002 at 4 ug/L. A third sample was collected on 24 June 2002 with phenol reported at a concentration of 0.63 ug/L by K-Prime, Inc. of Santa Rosa, California.

TABLE 5

Sampling of In-Situ Groundwater and Surface Water - Original and Current Required Laboratory Analyses and Sampling Frequencies

Chemplex Site, Clinton, Iowa

Clinton, Iowa

Well ID	Formation	Original PME Plan Requirements (a)			Current Requirements (a) (e)		
		Metals (b)	PAHs (c)	VOCs (d)	Metals (b)	PAHs (c)	VOCs (d)
3	OVB	-	Annually	Annually	-	Every 2 Years	Annually
4	OVB	-	-	Annually	-	-	Annually
ARMW-2	OVB	-	-	Annually	-	-	Annually
ARMW-200B	LSG	-	-	Annually	-	-	Annually
ARMW-200C	FC	-	-	Annually	-	-	Annually
DAC-2 (f)	OVB/USG	Annually	-	-	Every 2 Years	-	-
DG-16	USG	-	Annually	Annually	-	Every 2 Years	Annually
DG-17B	USG	-	Annually	Annually	-	Every 2 Years	Annually
DG-19B	USG	-	Annually	Annually	-	Every 2 Years	Annually
DG-21B	USG	-	Annually	Annually	-	Every 2 Years	Annually
EW-6b	FC	Annually	Annually	Annually	Every 2 Years	Every 2 Years	Annually
EW-6c	LH	-	Annually	Annually	-	Every 2 Years	Annually
EW-8a	USG	Annually	Annually	Annually	Every 2 Years	Every 2 Years	Annually
EW-11a	USG	Annually	-	-	Every 2 Years	-	-
EW-11c	LH	-	Annually	Annually	-	Every 2 Years	Annually
EW-13c	LH	-	Annually	Annually	-	Every 2 Years	Annually
EW-14c	LH	-	Annually	Annually	-	Every 2 Years	Annually
EW-15a	USG	-	Annually	Annually	-	Every 2 Years	Annually
EW-16c	LH	-	Annually	Annually	-	Every 2 Years	Annually
LF-2	OVB/USG	Annually	-	-	Every 2 Years	-	-
LF-4	OVB/USG	Annually	-	-	Every 2 Years	-	-
LF-6	OVB/USG	Annually	-	-	Every 2 Years	-	-
MW-4	OVB	-	Annually	Annually	-	Every 2 Years	Annually
MW-19B	USG	-	Annually	Annually	-	Every 2 Years	Annually
MW-30B	USG	-	-	Annually	-	-	Annually
MW-56	FC	-	-	Annually	-	-	Annually
MW-56-1	USG	-	-	Annually	-	-	Annually
MW-57	BL	-	Annually	Annually	-	Every 2 Years	Annually
MW-57-1	USG	-	Annually	Annually	-	Every 2 Years	Annually
MW-58	USG	-	-	Annually	-	-	Annually
MW-73	BL	-	Annually	Annually	-	Every 2 Years	Annually
MW-73-1	FC	-	Annually	Annually	-	Every 2 Years	Annually
MW-73-2	LSG	-	Annually	Annually	-	Every 2 Years	Annually
MW-85B	LSG	-	Annually	Annually	-	Every 2 Years	Annually
MW-85C	FC	-	Annually	Annually	-	Every 2 Years	Annually
MW-85D	BL	-	Annually	Annually	-	Every 2 Years	Annually
MW-87A	USG	-	Annually	Annually	-	-	Annually
MW-94A	OVB	-	-	Annually	-	-	Annually
MW-97B	LSG	-	Annually	Annually	-	Every 2 Years	Annually
MW-99A	OVB	-	Annually	Annually	-	Every 2 Years	Annually
MW-106A	USG	-	Annually	Annually	-	Every 2 Years	Annually
MW-106B	LSG	-	Annually	Annually	-	Every 2 Years	Annually

TABLE 5

Sampling of In-Situ Groundwater and Surface Water - Original and Current Required Laboratory Analyses and Sampling Frequencies

Chemplex Site, Clinton, Iowa

Clinton, Iowa

Well ID	Formation	Original PME Plan Requirements (a)			Current Requirements (a) (e)		
		Metals (b)	PAHs (c)	VOCs (d)	Metals (b)	PAHs (c)	VOCs (d)
MW-106C	FC	-	Annually	Annually	-	Every 2 Years	Annually
MW-107A	OVB	-	Annually	Annually	-	Every 2 Years	Annually
MW-107B	LSG	-	Annually	Annually	-	Every 2 Years	Annually
MW-107C	FC	-	Annually	Annually	-	Every 2 Years	Annually
MW-108B	LSG	-	Annually	Annually	-	Every 2 Years	Annually
MW-109B	LSG	-	Annually	Annually	-	Every 2 Years	Annually
MW-109C	FC	-	Annually	Annually	-	Every 2 Years	Annually
MW-110B	LSG	-	Annually	Annually	-	Every 2 Years	Annually
MW-111B	LSG	-	Annually	Annually	-	Every 2 Years	Annually
PB-2	OVB	Annually	-	-	Every 2 Years	-	-
MUNCK	UNKN	-	Semiannually	Semiannually	-	-	Annually
PIETSCHER (g)	UNKN	-	Semiannually	Semiannually	-	-	-
WELL 1Q	UNKN	-	Semiannually	Semiannually	-	Every 2 Years	Every 2 Years
WELL 2Q	UNKN	-	Semiannually	Semiannually	-	Every 2 Years	Every 2 Years
WELL 3Q	UNKN	-	Semiannually	Semiannually	-	-	-
WELL 4Q	UNKN				-	Every 2 Years	Every 2 Years
WELL 6Q	UNKN	-	Semiannually	Semiannually	-	Every 2 Years	Every 2 Years
West Trib.	NA	-	Annually	Annually	-	Every 2 Years	Annually

Notes:

(a) Does not include duplicate samples.

(b) Samples indicated are to be analyzed for antimony, arsenic, and barium.

(c) Samples indicated are to be analyzed for polynuclear hydrocarbons ("PAHs") by EPA Method 8310 or 610.

(d) Samples indicated are to be analyzed for volatile organic compounds ("VOCs") by CLPSAS

(e) Modification in sampling frequency approved in EPA letters dated 24 July 1998 and 1 April 1999, with frequencies of "Every 2 Years" to occur in odd numbered years.

(f) Well DAC-2 can no longer be sampled, so nearby extraction well DAC-1 is sampled in its place.

(g) The Pietscher well was plugged and abandoned in June 1997 and is no longer available for sampling.

(h) A dash ("-") indicates that there is no monitoring requirement.

Abbreviations:

PME = Performance Monitoring Evaluation
AOA = Area of Attainment
MUNCK = Munck Residence Well
PAHs = Polynuclear Aromatic Hydrocarbons
VOCs = Volatile Organic Compounds

Formation Abbreviations:

OVB = Overburden
USG = Upper Scotch Grove
NA = Not Applicable
LSG = Lower Scotch Grove
FC = Farmers Creek
UNKN = Unknown
LH = Lower Hopkinton
BL = Blanding

TABLE 6

Area of Attainment Wells with Detected Chemical Concentrations Exceeding Cleanup Standards During May 2003 Groundwater Sampling Event

Chemplex Site - First Operable Unit

Clinton, Iowa

Layer	Well Identification	Compounds Exceeding Cleanup Standard	Cleanup Standard (ug/L)	May 2003 Detected Concentration (ug/L)
Overburden	MW-99A	Tetrachloroethene	5	7
Upper Scotch Grove	EW-15a	Tetrachloroethene	5	5
		Trichloroethene	3	4
	MW-106A	Tetrachloroethene	5	21
Lower Scotch Grove	MW-73-2	Tetrachloroethene	5	180
		Trichloroethene	3	13
	MW-108B	Tetrachloroethene	5	560
		Trichloroethene	3	50
	MW-109B	Tetrachloroethene	5	320
		Trichloroethene	3	12
	MW-110B	Tetrachloroethene	5	10
Farmers Creek	EW-6b	Tetrachloroethene	5	39
	MW-73-1	Tetrachloroethene	5	23
	MW-107C	Tetrachloroethene	5	21
	MW-109C	Tetrachloroethene	5	220
		Trichloroethene	3	8
Lower Hopkinton	EW-14c	Tetrachloroethene	5	12

TABLE 7

Summary of VOCs Detected in the Western Un-Named Tributary (a)

Chemplex Site - First Operable Unit

Clinton, Iowa

	Concentration (ug/L) (b)				
	5/26/1999	4/25/2000	6/15/2001	5/15/2002	5/2/2003
Acetone	<5	<5	<5	<10	<10/<10
Benzene	<1	<1	<1	<0.5	<0.5/<0.5
2-Butanone	<5	<5	<5	**0.4 J**	<10/<10
cis-1,2-Dichloroethene	**0.9 J**	<1	**3**	**1**	<0.5/<0.5
Methylene Chloride	<2	<2	1 B	**0.6 (c)**	<0.5/<0.5
Tetrachloroethene	**0.2 J**	**1**	**3**	**2**	0.5/<0.5
Trichloroethene	<1	<1	**1**	**0.6**	<0.5/<0.5

Notes:

(a) Sample was collected from the Western Un-Named Tributary at its crossing under 21st Street.

(b) Concentrations shown in **boldface type** indicate detections above laboratory practical quantitation limit and represent valid detections.

"J" qualifier following value indicates that the analyte was detected at the concentration shown, but that the value was less than the laboratory method detection limit, but greater than the laboratory practical quantitation limit.

"B" qualifier following value indicates that the analyte was detected in the associated blank as well as in the sample, and therefore does not represent a valid detection.

"JB" qualifier following value indicates that the analyte was below the laboratory method detection limit, and was detected in the associated blank as well as in the sample, and therefore does not represent a valid detection.

(c) Methylene chloride is a common laboratory contaminant. At low concentrations, it is likely that the detection resulted from laboratory contamination.

Abbreviations:

ug/L - micrograms per liter

TABLE 8

Summary of Chemicals Detected in Equistar Production Wells During 2003

Well Number	Compounds Detected	Concentration (ug/L)
1	Methylene Chloride	0.3 J (probable lab contaminant)
	PCE	0.3 J
2	Carbon Tetrachloride	0.3 J
	Chloroform	0.3 J
	1,1-DCE	1
	cis-1,2-DCE	2
	PCE	5
	1,1,1-Trichloroethane	2
	TCE	0.5
	Trichlorofluoromethane	0.6
4	Chlorobenzene	0.2 J (probable lab contaminant)
	Methylene Chloride	0.4 J (probable lab contaminant)
6	Methylene Chloride	0.4 J (probable lab contaminant)

TABLE 9

Summary of PAH Concentrations Detected During Groundwater Sampling Events Since 1998

Chemplex Site - First Operable Unit

Clinton, Iowa

	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
Current Remedial Goal (ug/L)	-	-	-	-	0.2	-	-	-	-	-	-	-	-	20	-	-
1999																
# of Samples (a)	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
# Above Remedial Goal (b)	-	-	-	-	0	-	-	-	-	-	-	-	-	0	-	-
Maximum Conc. (ug/L) (c)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lab Reporting Limit (ug/L)	18	23	6.6	0.13	0.23	0.18	0.76	0.17	1.5	0.3	2.1	2.1	0.43	18	6.4	2.7
2001																
# of Samples (a)	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
# Above Remedial Goal (b)	-	-	-	-	0	-	-	-	-	-	-	-	-	0	-	-
Maximum Conc. (ug/L) (c)	0.43	0.46	0.14	-	-	-	-	-	-	-	-	0.35	-	1.4	0.72	-
Lab Reporting Limit (ug/L)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
2003																
# of Samples (a)	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
# Above Remedial Goal (b)	-	-	-	-	0	-	-	-	-	-	-	-	-	0	-	-
Maximum Conc. (ug/L) (c)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.41	-	-
Lab Reporting Limit (ug/L)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

TABLE 9

Summary of PAH Concentrations Detected During Groundwater Sampling Events Since 1998

Chemplex Site - First Operable Unit

Clinton, Iowa

Notes:

(a) Duplicate samples and blanks are not shown.
(b) Sample results are not presented in cases where the given compound was detected in one of the sample's associated blanks.
(c) Maximum concentrations may include estimated concentrations (i.e., concentrations less than the analytical laboratory's stated Practical Quantitation Limit) reported by the laboratory with a "J" data qualifier.

Abbreviations:

PAH = Polynuclear Aromatic Hydrocarbons
ug/L = micrograms per liter
- = Not Applicable

TABLE 9a

PAH Concentrations in Groundwater Samples

Spring 2003 Annual Groundwater Sampling Event

Chemplex Site, Clinton, Iowa

Sample ID	Sample Date	Concentration in µg/L (a)															
		Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene	Dibenzo (a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
3	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
DG-16	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.12 J	0.2 U	0.2 U
DG-17B	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
DG-19B	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
DG-21B	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
EW-6b	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
EW-6c	4/30/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
EW-6c (Dup)	4/30/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.405	0.2 U	0.2 U
EW-8a	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
EW-11c	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
EW-13c	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
EW-14c	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
EW-15a	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
EW-16c	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MUNCK	4/30/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-4	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-19B	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-57	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-57-1	4/30/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-73	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-73-1	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-73-2	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-85B	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

TABLE 9a

PAH Concentrations in Groundwater Samples
Spring 2003 Annual Groundwater Sampling Event

Chemplex Site, Clinton, Iowa

Sample ID	Sample Date	Concentration in µg/L (a)															
		Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene	Dibenzo (a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
MW-85C	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-85D	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-85D (Dup.)	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-97B	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-99A	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-106A	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-106B	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-106B (Dup.)	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-106C	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-107A	4/30/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-107B	4/30/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-107C	4/30/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-108B	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-109B	5/2/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-109C	5/2/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-110B	4/30/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-110B (Dup.)	4/30/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
MW-111B	4/29/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
WELL 1Q	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
WELL 2Q	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
WELL 4Q	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
WELL 6Q	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
WESTTRIB (b)	5/2/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

TABLE 9a

PAH Concentrations in Groundwater Samples
Spring 2003 Annual Groundwater Sampling Event

Chemplex Site, Clinton, Iowa

Sample ID	Sample Date	Concentration in µg/L (a)															
		Acenaphthene	Acenaphthylene	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perylene	Benzo (k) fluoranthene	Chrysene	Dibenzo (a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene
QA/QC Samples																	
FIELD BLANK 3	4/30/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
FIELD BLANK 4	5/1/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
FIELD BLANK 7	5/2/2003	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

Notes:

(a) Boldface type indicates concentration detected above laboratory practical quantitation limit.
"U" following value indicates that the analyte was not detected above the method detection limit indicated.
"J" following value indicates that the analyte was detected at the concentration shown, but that the value was less than the laboratory method detection limit, and greater than the laboratory practical quantitation limit.
"P" following value indicates that there is greater than 25% difference for detected concentrations between the two GC columns.

(b) Sample indicated was of surface water collected from the Western Un-Named Tributary at its crossing under 21st Street.

Abbreviations:

PAH = Polynuclear Aromatic Hydrocarbon
µg/L = micrograms per liter
QA/QC = Quality Assurance/Quality Control
Dup = Duplicate
FB = Field Blank

TABLE 10

Summary of Metal Concentrations Detected During Groundwater Sampling Events Since 1998

Chemplex Site - First Operable Unit

Clinton, Iowa

	Antimony	Arsenic	Barium
Current Remedial Goal (ug/L)	3	0.03	2,000
1999			
Number of Samples (a)	8	8	8
Number of Samples Above Remedial Goal (b)	0	1	0
Maximum Detected Concentration (ug/L) (c)	-	25.9	1,500
Lab Reporting Limit (ug/L)	5-15	3.3-10	3
2001			
Number of Samples (a)	8	8	8
Number of Samples Above Remedial Goal (b)	0	1	0
Maximum Detected Concentration (ug/L) (c)	-	30	888
Lab Reporting Limit (ug/L)	3	3.3	1
2003			
Number of Samples (a)	8	8	8
Number of Samples Above Remedial Goal (b)	0	1	0
Maximum Detected Concentration (ug/L) (c)	-	21.6	1,000
Lab Reporting Limit (ug/L)	30	10	5

Notes:

(a) Duplicate samples and blanks are not shown.

(b) Sample results are not presented in cases where the given compound was detected in one of the sample's associated blanks..

(c) Maximum concentrations may include estimated concentrations (i.e., concentrations less than the analytical laboratory's stated Practical Quantitation Limit) reported by the laboratory with a "J" data qualifier.

Abbreviations:

ug/L = micrograms per liter

- = Not Applicable

TABLE 10a

Concentrations of Metals in Groundwater Samples
Spring 2003 Annual Groundwater Sampling Event

Chemplex Site, Clinton, Iowa

Sample ID	Sample Date	Concentration in µg/L (a)		
		Antimony	Arsenic	Barium
DAC-1	4/30/2003	30 U	10 U	**84.5**
EW-6b	4/29/2003	30 U	10 U	**35.7**
EW-8a	4/29/2003	30 U	10 U	**31.4**
EW-11a	4/29/2003	30 U	10 U	**46.5**
LF-2	4/29/2003	30 U	10 U	**36.9**
LF-4	4/29/2003	30 U	10 U	**61.7**
LF-6	4/29/2003	30 U	**21.6**	**1000**
PB-2	4/30/2003	30 U	10 U	**82.4**
PB-2 (Dup.)	4/30/2003	30 U	10 U	**85.5**
QA/QC Samples				
FIELD BLANK 1	4/30/2003	30 U	10 U	5 U

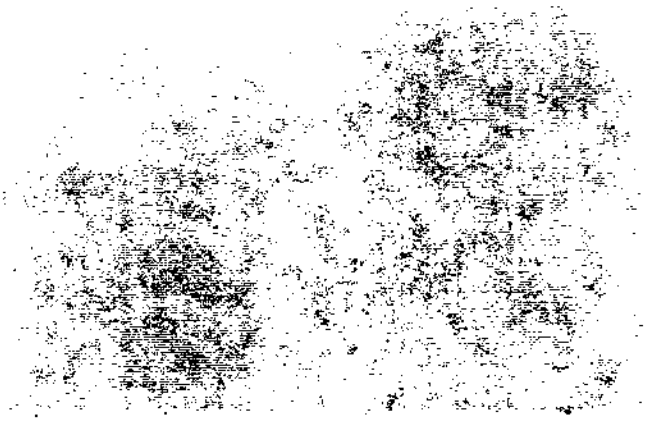
Notes:

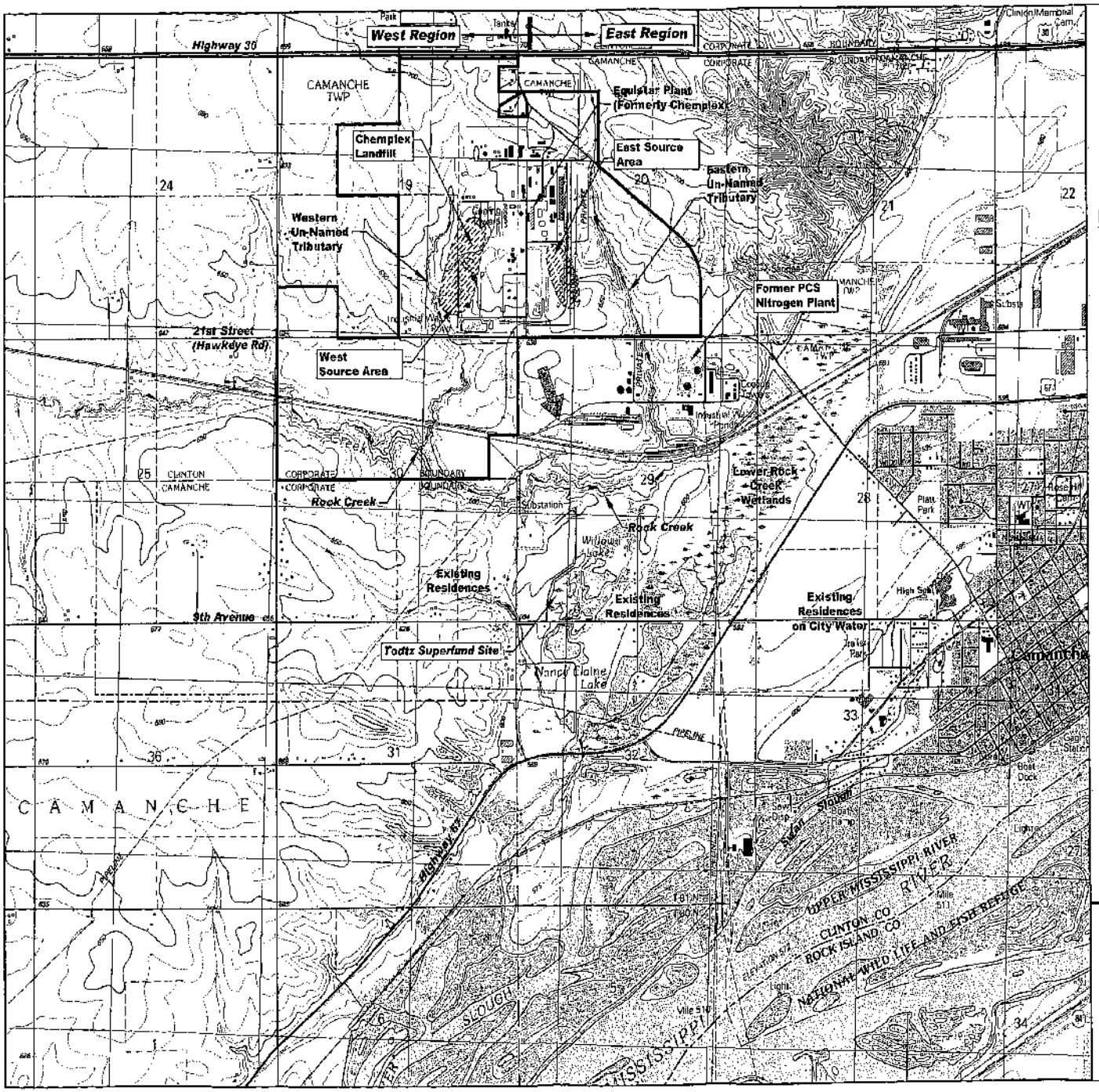
(a) Boldface type indicates concentration detected above laboratory practical quantitation limit.
"U" following value indicates that the analyte was not detected above the method detection limit indicated.

Abbreviations:

ug/L = micrograms per liter
Dup. = Duplicate
QA/QC = Quality Assurance/Quality Control
FB = Field Blank

Figures





N

0 2000 4000

(Approximate Scale in Feet)

Legend:

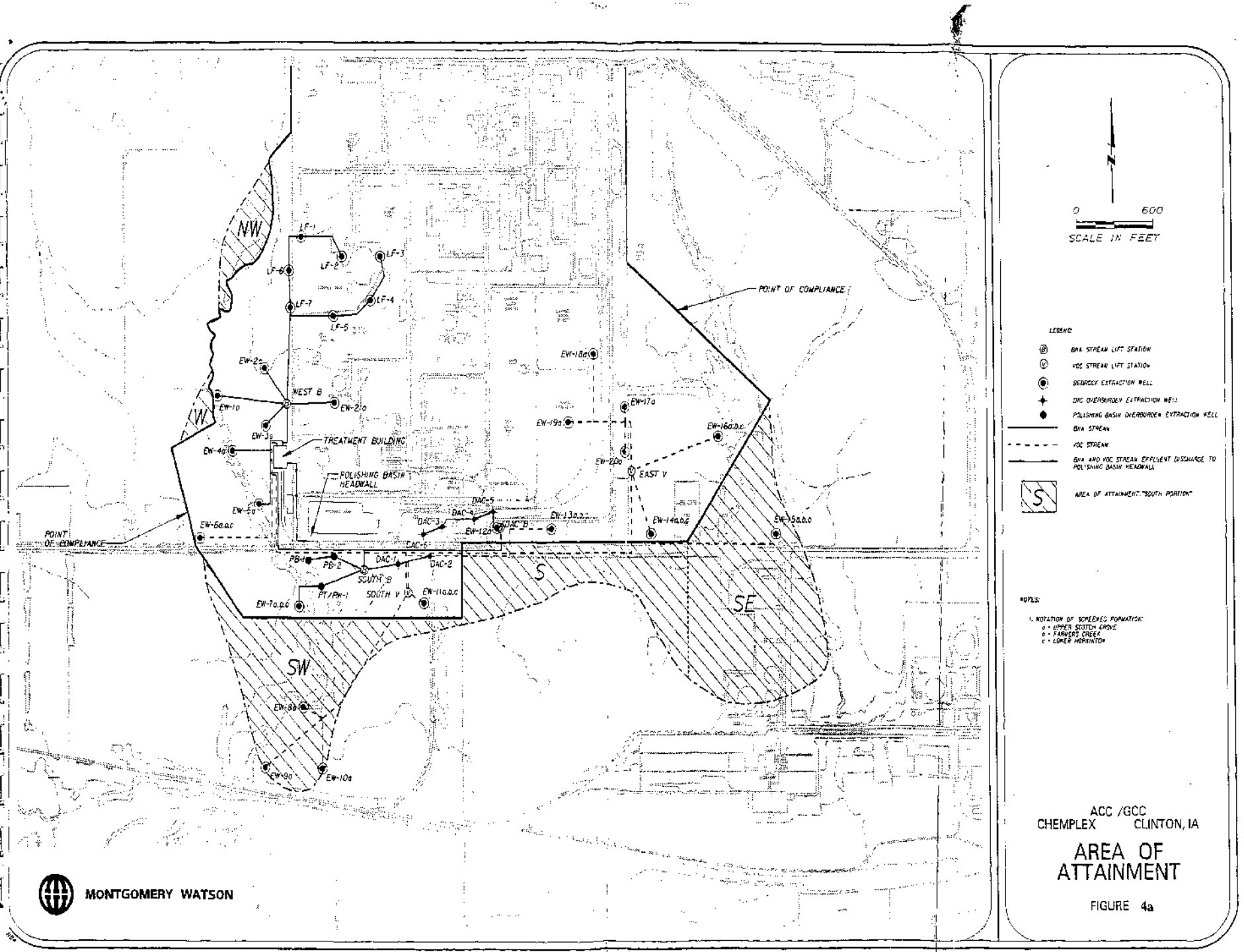
- Approximate Property Boundary (Equistar and ACC/GCC)
- General Groundwater Flow Direction
- Creek Flow Direction
- Approximate Source Area

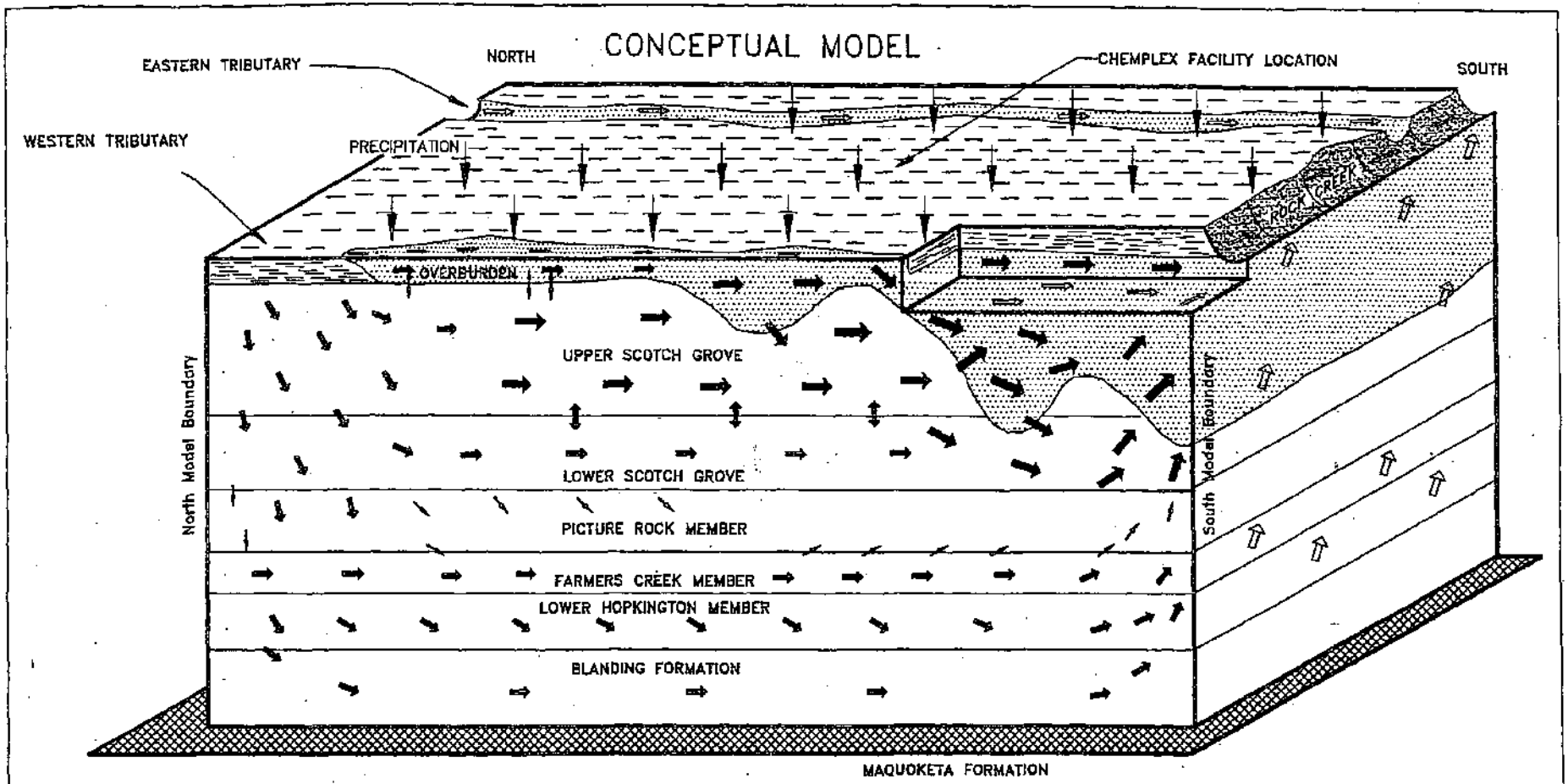
Erler & Kalinowski, Inc.

Chemplex Site and Vicinity Map

Chemplex
Clinton, Iowa
January 2004
EKI 890052.56

Figure 3a


NW
W
SW
S
SE
LF-1
LF-2
LF-3
LF-4
LF-5
LF-6
LF-7
EW-2a
EW-1a
EW-3a
EW-4a
EW-5a
EW-6a,b,c
EW-7a,b,c
EW-8a
EW-9a
EW-10a
EW-11a,b,c
EW-12a
EW-13a,b,c
EW-14a,b,c
EW-15a,b,c
EW-16a,b,c
EW-17a
EW-18a
EW-19a
EW-20a
WEST B
EAST V
SOUTH B
SOUTH V
PT/FW-1
PB-1
PB-2
DAC-1
DAC-2
DAC-3
DAC-4
DAC-5
DAC-6
DAC-B
TREATMENT BUILDING
POLISHING BASIN HEADWALL
POINT OF COMPLIANCE
POINT OF COMPLIANCE
0
600
SCALE IN FEET
LEGEND
BIA STREAM LIFT STATION
VOC STREAM LIFT STATION
BEDROCK EXTRACTION WELL
DAC OVERBURDEN EXTRACTION WELL
POLISHING BASIN OVERBURDEN EXTRACTION WELL
BIA STREAM
VOC STREAM
BIA AND VOC STREAM EFFLUENT DISCHARGE TO POLISHING BASIN HEADWALL
AREA OF ATTAINMENT "SOUTH PORTION"
NOTES:
1. NOTATION OF SCREENED FORMATION:
a - UPPER SCOTCH GROVE
b - FARMERS CREEK
c - LOWER HOPKINTON
MONTGOMERY WATSON
ACC /GCC
CHEMPLEX CLINTON, IA
AREA OF ATTAINMENT
FIGURE 4a



LEGEND

- Arrow indicates the direction of Groundwater Flow (its size is proportional to the magnitude of Groundwater Flow)
- Creek Bottom Sediments
- Sand Deposits
- Silt/Clay Deposits
- Two-Headed Arrow indicates Flow Direction Changes throughout year.

NOTES

1. All dimensions shown are NOT to scale.
2. Groundwater flow directions and magnitudes may vary depending upon rainfall infiltration rates..

Erler & Kalinowski, Inc.

Conceptual Model

Chemplex Project
Clinton, Iowa
August 1992
EKI 890052.09

Figure 3b

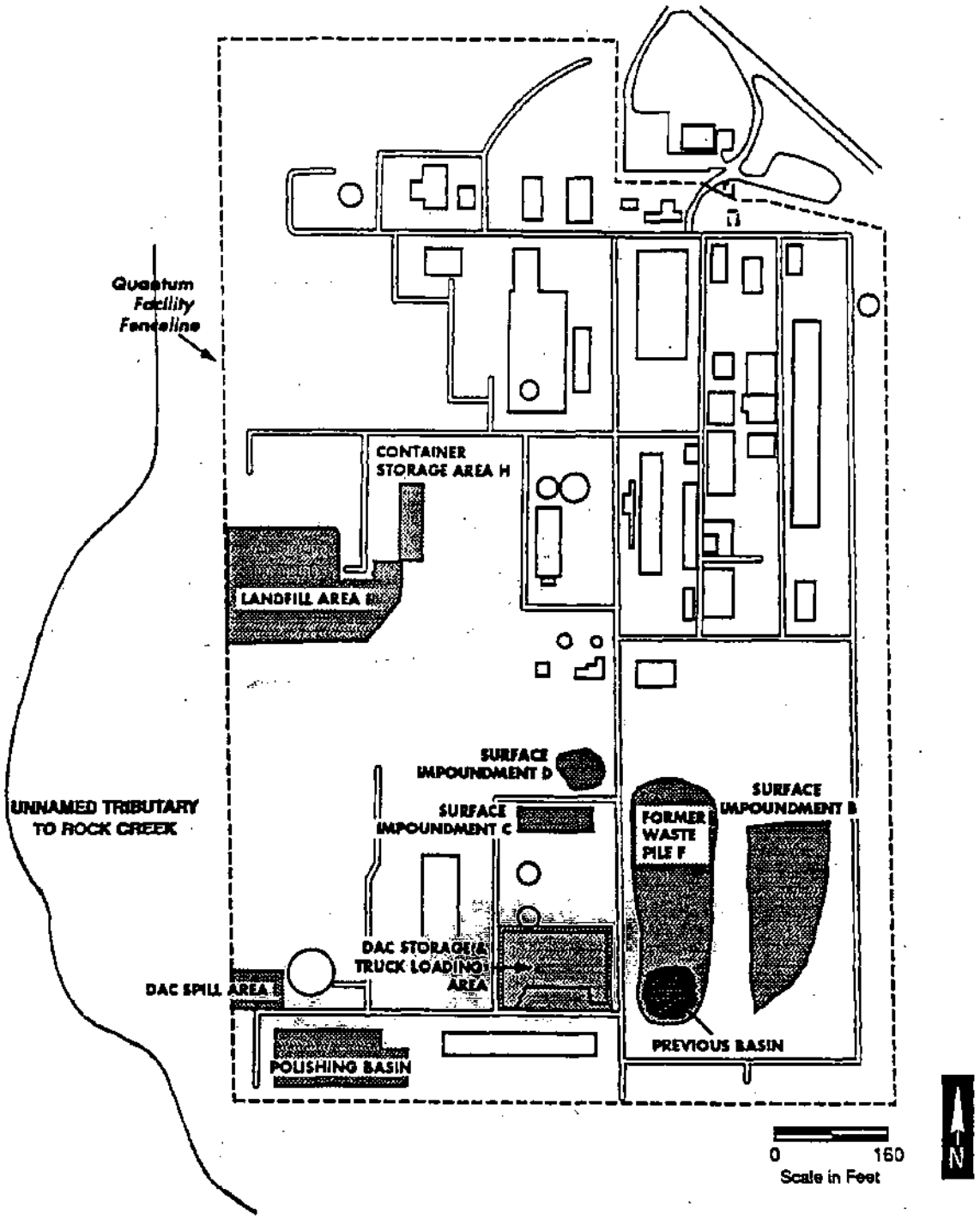
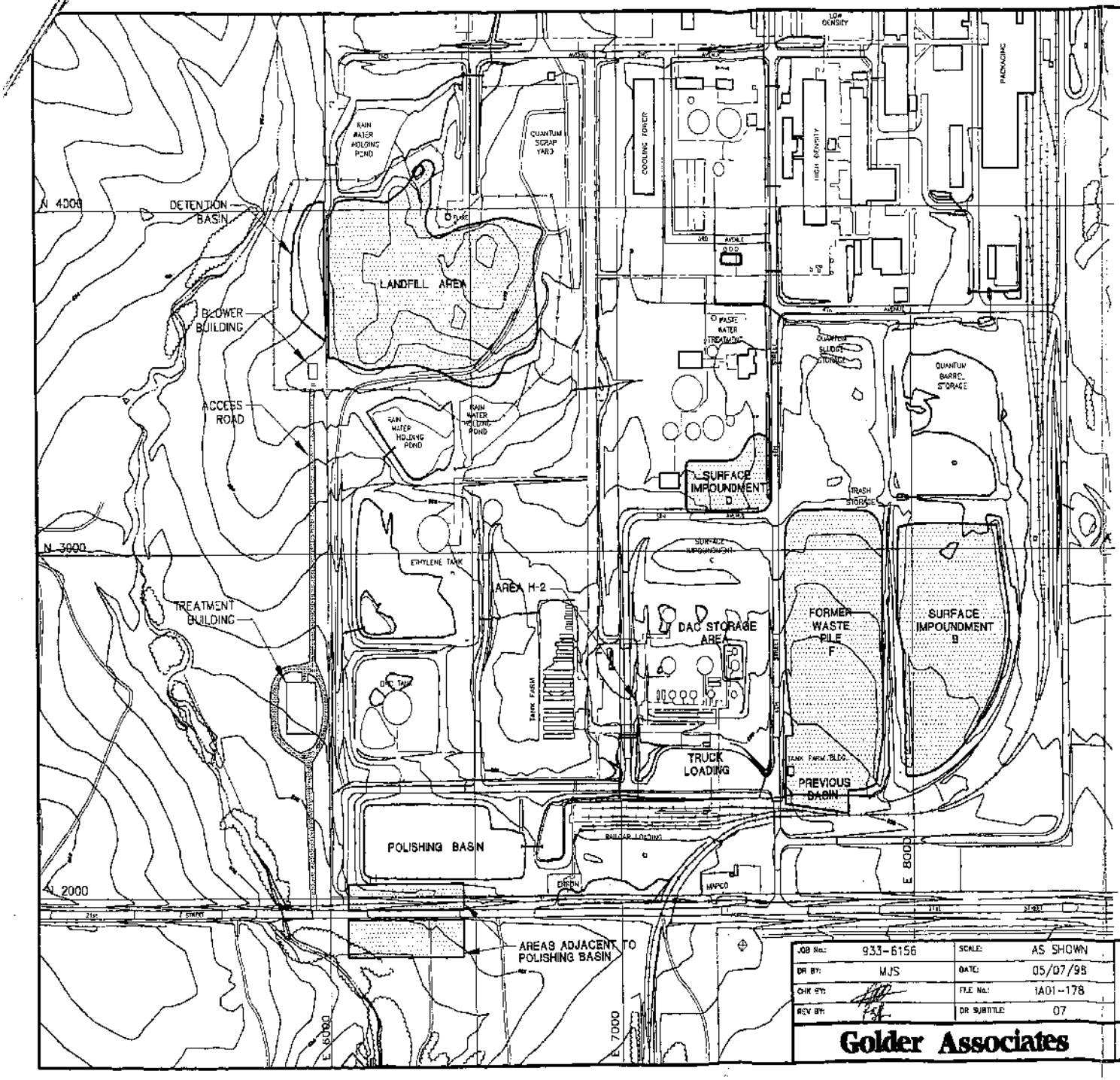


FIGURE 3c

On-Site Areas of Potential Concern- Chemplex Site: Clinton, Iowa



LEGEND

AREA TO BE ADDRESSED BY OU-2 (AREA H-2 TOO SMALL TO BE SHOWN)

NOTES

1.) LOCATIONS OF BLOWER BUILDING, TREATMENT BUILDING, LANDFILL SECURITY FENCE, DETENTION BASIN AND ACCESS ROAD ARE APPROXIMATE.

REFERENCES

1.) BASE MAP TAKEN FROM DRAWING CREATED BY SCHOELL & MADSON, INC., TITLED "TOPOGRAPHIC DRAWING & MONITORING POINT LOCATIONS, CHEMPLEX PLANT VICINITY, CLINTON, IOWA," DATED SEPTEMBER 13, 1990.

2.) COORDINATE SYSTEM REVISED BY SCHOELL & MADSON, INC., ON 01/10/94 BASED UPON THE SOUTHWEST FENCE CORNER COORDINATES OF N 2006, E 6000.

MAY 08 1998

300 0 300

scale feet

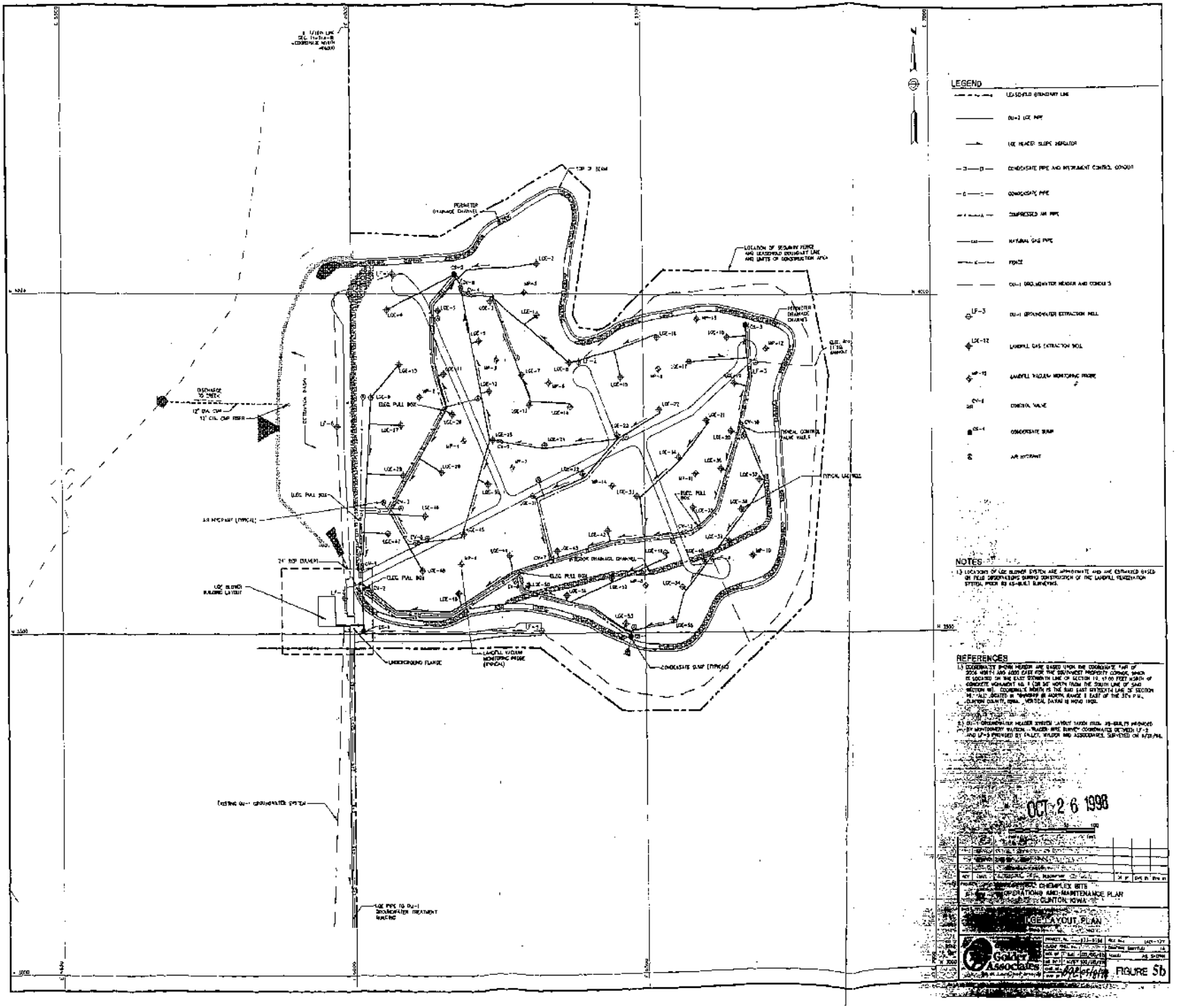
JOB No.:	933-6156	SCALE:	AS SHOWN
DR BY:	MJS	DATE:	05/07/98
CHK BY:		FILE No.:	1A01-178
REV BY:		DR SUBTITLE:	07

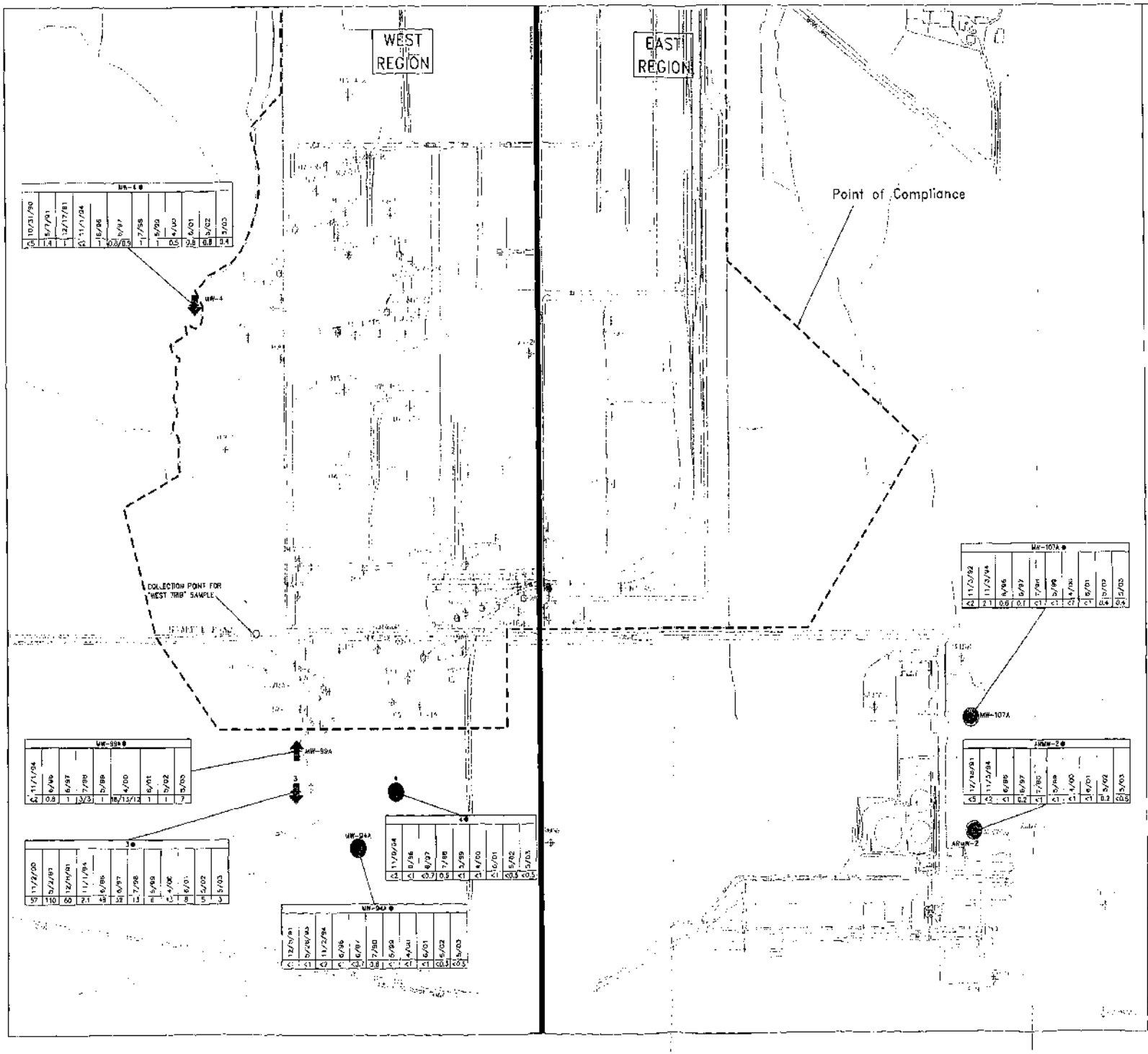
Golder Associates

SITE PLAN

CHEMPLEX/OU-2/1A

FIGURE 5a

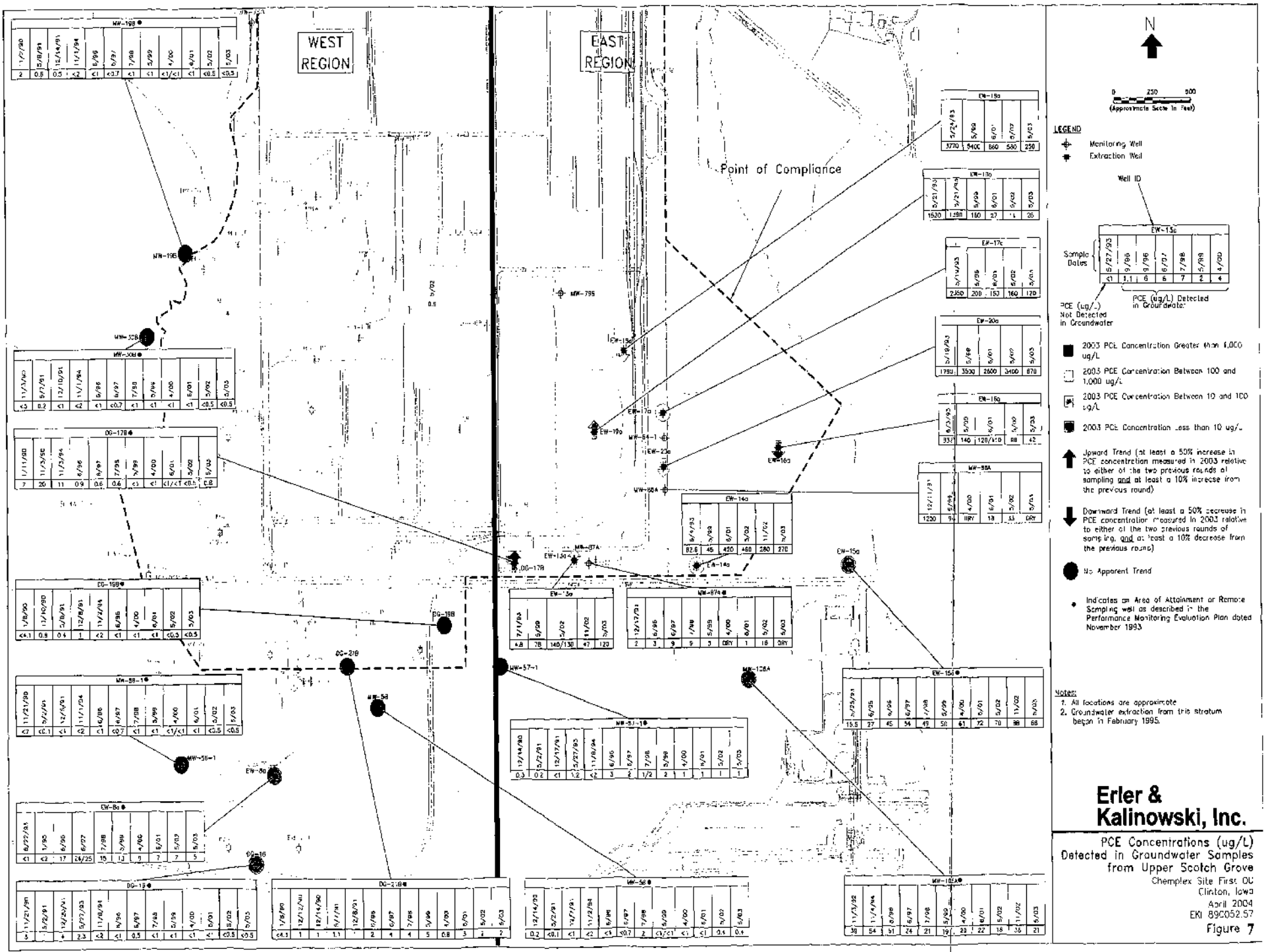

LEGEND
NOTES
REFERENCES
OCT 26 1998
FIGURE 5b

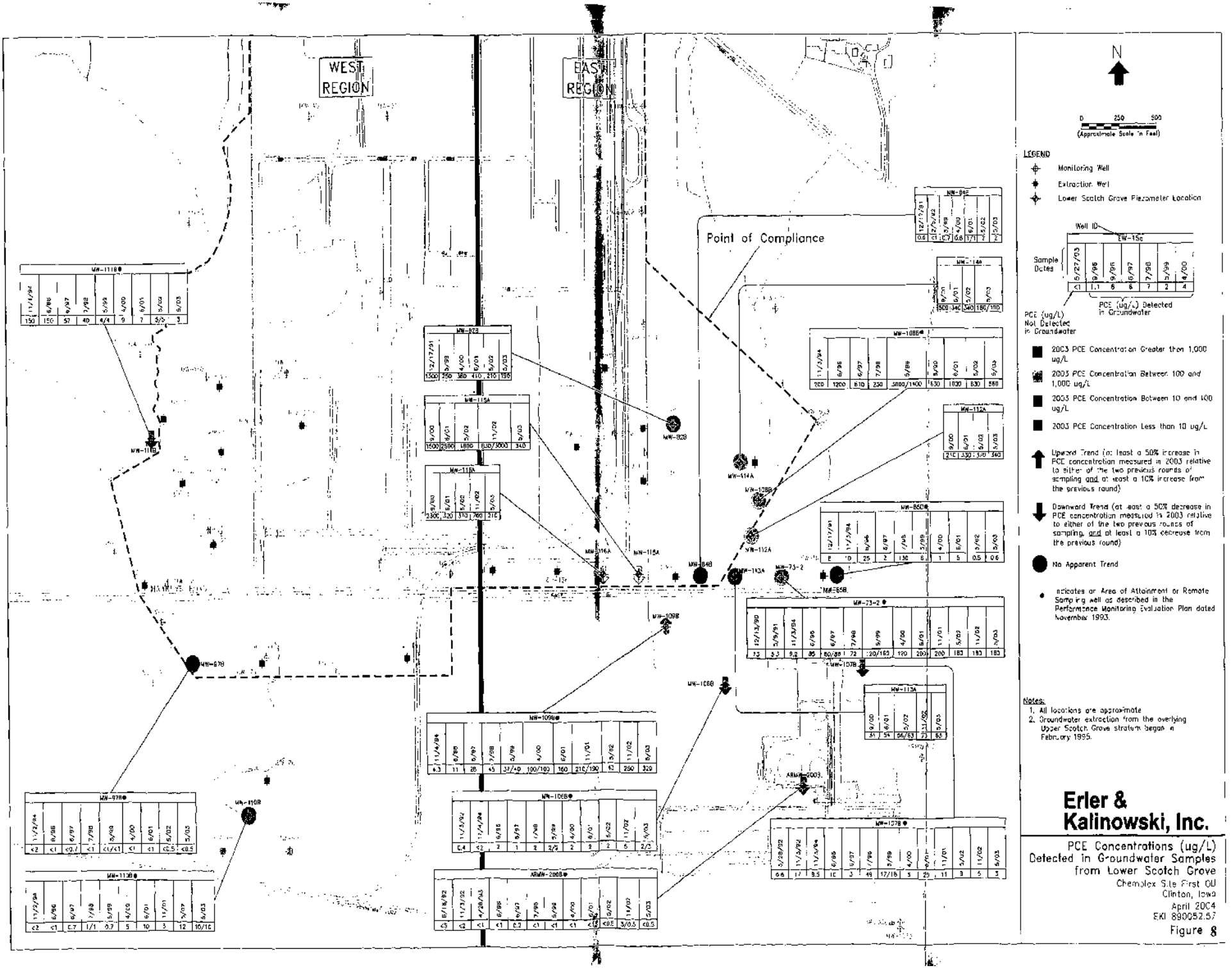


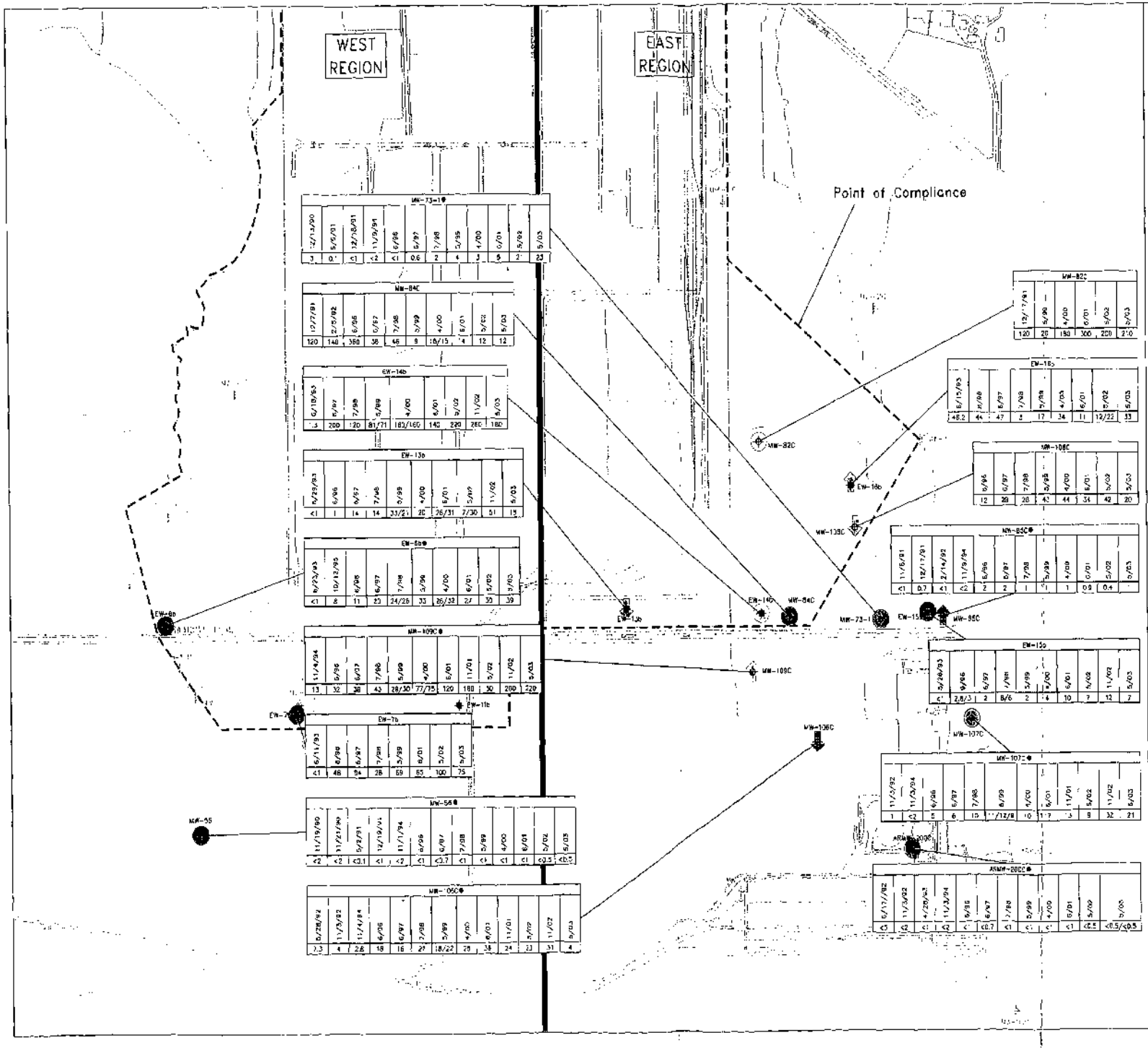
Erler & Kalinowski, Inc.

PCE Concentrations (ug/L) Detected in Groundwater Samples from Overburden

Chemplex Site First OU
Clinton, Iowa
April 2004
EKI 890052.57
Figure 6


WEST REGION
EAST REGION
Point of Compliance
N
0 250 500
(Approximate Scale in Feet)
LEGEND
Monitoring Well
Extraction Well
Well ID
Sample Dates
PCE (ug/L) Detected in Groundwater
PCE (ug/L) Not Detected in Groundwater
2003 PCE Concentration Greater than 1,000 ug/L
2003 PCE Concentration Between 100 and 1,000 ug/L
2003 PCE Concentration Between 10 and 100 ug/L
2003 PCE Concentration Less than 10 ug/L
Upward Trend (at least a 50% increase in PCE concentration measured in 2003 relative to either of the two previous rounds of sampling and at least a 10% increase from the previous round)
Downward Trend (at least a 50% decrease in PCE concentration measured in 2003 relative to either of the two previous rounds of sampling, and at least a 10% decrease from the previous round)
No Apparent Trend
Indicates an Area of Attainment or Remote Sampling well as described in the Performance Monitoring Evaluation Plan dated November 1993
Notes:
1. All locations are approximate
2. Groundwater extraction from this stratum began in February 1995.
Erler & Kalinowski, Inc.
PCE Concentrations (ug/L) Detected in Groundwater Samples from Upper Scotch Grove
Chemplex Site First OU
Clinton, Iowa
April 2004
EKI 89C052.57
Figure 7


WEST REGION
EAST REGION
Point of Compliance
N
0 250 500
(Approximate Scale in Feet)
LEGEND
Monitoring Well
Extraction Well
Lower Scotch Grove Piezometer Location
Well ID
Sample Dates
PCE (ug/L) Detected in Groundwater
PCE (ug/L) Not Detected in Groundwater
2003 PCE Concentration Greater than 1,000 ug/L
2003 PCE Concentration Between 100 and 1,000 ug/L
2003 PCE Concentration Between 10 and 100 ug/L
2003 PCE Concentration Less than 10 ug/L
Upward Trend (at least a 50% increase in PCE concentration measured in 2003 relative to either of the two previous rounds of sampling and at least a 10% increase from the previous round)
Downward Trend (at least a 50% decrease in PCE concentration measured in 2003 relative to either of the two previous rounds of sampling, and at least a 10% decrease from the previous round)
No Apparent Trend
Indicates an Area of Attainment or Remote Sampling well as described in the Performance Monitoring Evaluation Plan dated November 1993.
Notes:
1. All locations are approximate
2. Groundwater extraction from the overlying Upper Scotch Grove stratum began in February 1995.
Erler & Kalinowski, Inc.
PCE Concentrations (ug/L) Detected in Groundwater Samples from Lower Scotch Grove
Chemplex Site First OU
Clinton, Iowa
April 2004
EKI 890052.5.7
Figure 8

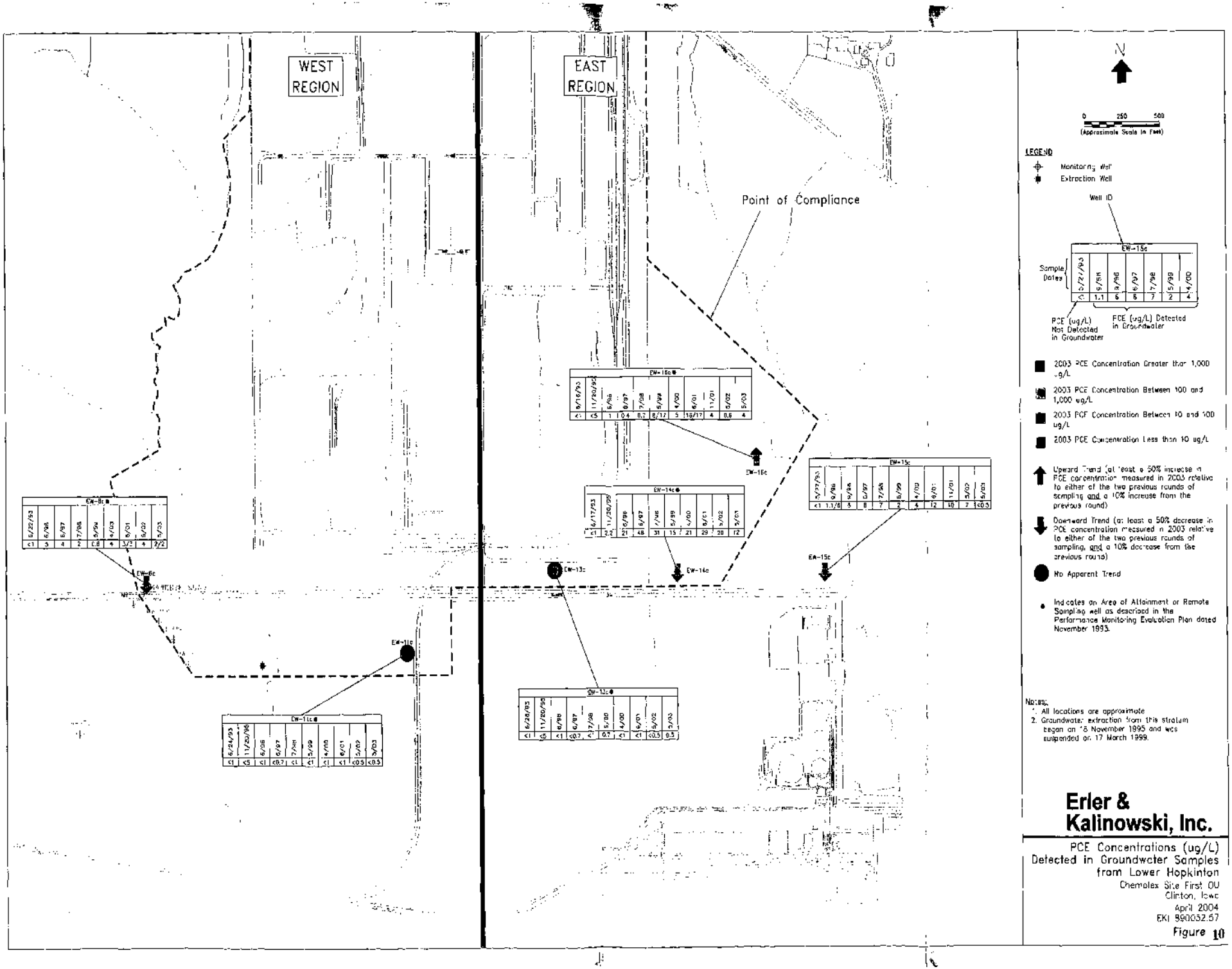


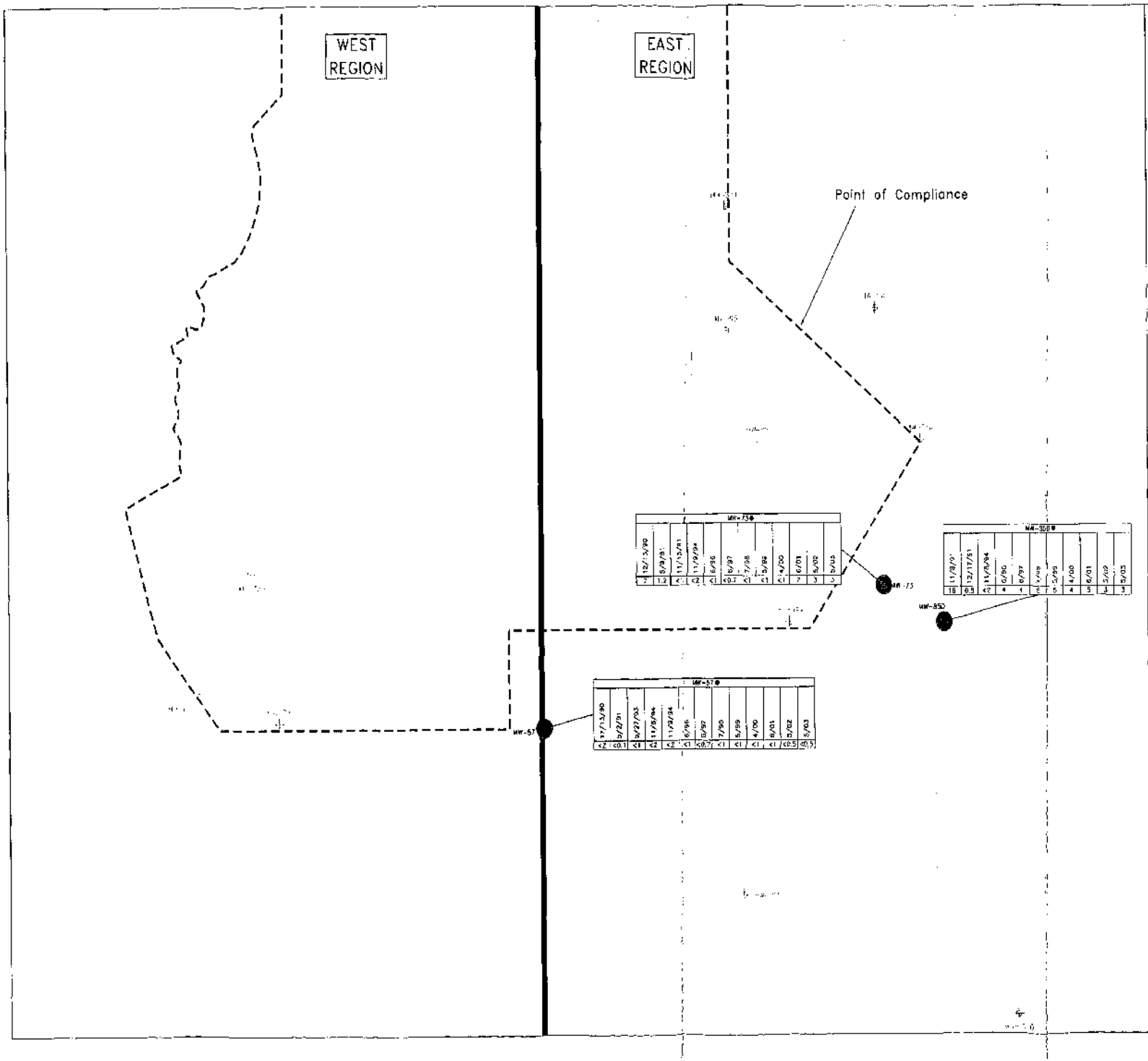
Erler & Kalinowski, Inc.

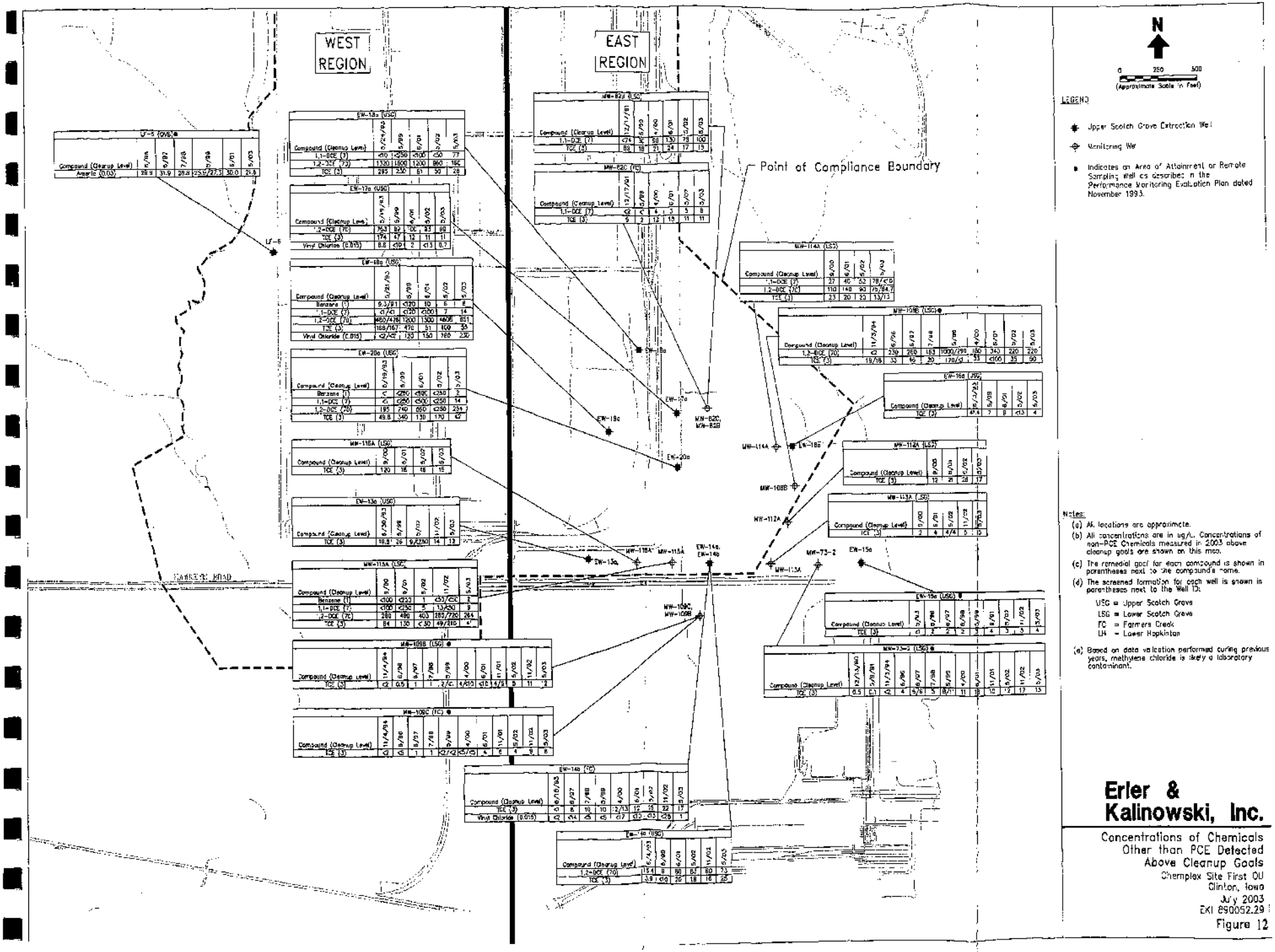
PCE Concentrations (ug/L) Detected in Groundwater Samples from Farmers Creek

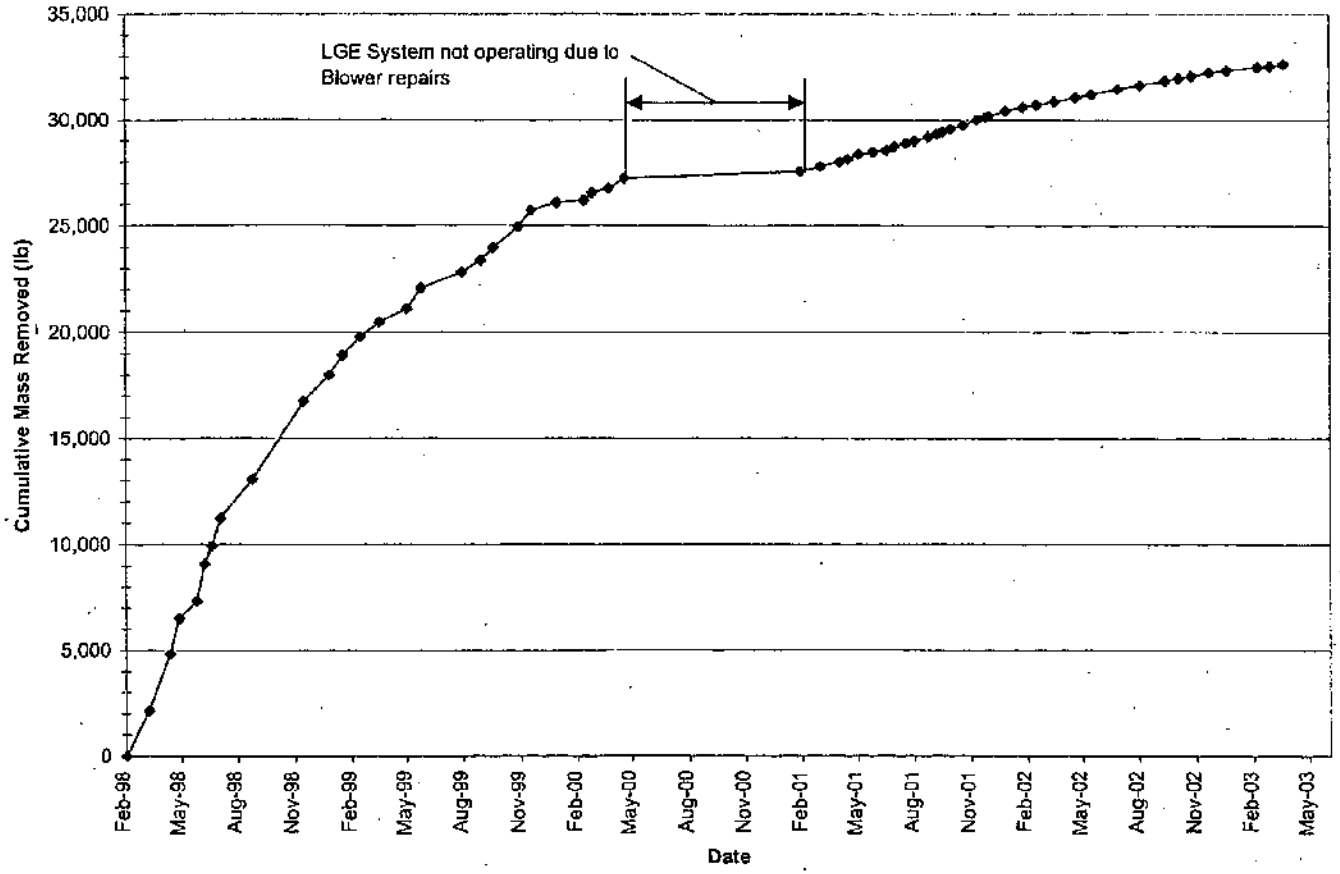
Chemplex Site First OU
Clinton, Iowa
April 2004
EKI 890052.57

Figure 9


WEST REGION
EAST REGION
Point of Compliance
EW-8c
EW-9c
EW-11c
EW-13c
EW-14c
EW-15c
EW-16c
N
0 250 500
(Approximate Scale in Feet)
LEGEND
Monitoring Well
Extraction Well
Well ID
Sample Dates
PCE (ug/L) Not Detected in Groundwater
PCE (ug/L) Detected in Groundwater
2003 PCE Concentration Greater than 1,000 ug/L
2003 PCE Concentration Between 100 and 1,000 ug/L
2003 PCE Concentration Between 10 and 100 ug/L
2003 PCE Concentration Less than 10 ug/L
Upward Trend (at least a 50% increase in PCE concentration measured in 2003 relative to either of the two previous rounds of sampling and a 10% increase from the previous round)
Downward Trend (at least a 50% decrease in PCE concentration measured in 2003 relative to either of the two previous rounds of sampling, and a 10% decrease from the previous round)
No Apparent Trend
Indicates an Area of Attainment or Remote Sampling well as described in the Performance Monitoring Evaluation Plan dated November 1993.
Notes:
1. All locations are approximate
2. Groundwater extraction from this stratum began on 18 November 1995 and was suspended on 17 March 1999.
Erler & Kalinowski, Inc.
PCE Concentrations (ug/L) Detected in Groundwater Samples from Lower Hopkinton
Chemplex Site First OU
Clinton, Iowa
April 2004
EKI 990052.57
Figure 10


WEST REGION
EAST REGION
Point of Compliance
MW-73
MW-85D
MW-57
N
0 250 500
(Approximate Scale in Feet)
LEGEND
Monitoring Well
Well ID
EW-15c
Sample Dates
5/27/93 9/96 9/96 6/97 7/98 5/99 4/00
<1 8.1 8 8 7 2 4
PCE (ug/L) Not Detected in Groundwater
PCE (ug/L) Detected in Groundwater
2003 PCE Concentration Greater than 1,000 ug/L
2003 PCE Concentration Between 100 and 1,000 ug/L
2003 PCE Concentration Between 10 and 100 ug/L
2003 PCE Concentration Less than 10 ug/L
Upward Trend (at least a 50% increase in PCE concentration measured in 2003 relative to either of the two previous rounds of sampling and at least a 10% increase from the previous round)
Downward Trend (at least a 50% decrease in PCE concentration measured in 2003 relative to either of the two previous rounds of sampling, and at least a 10% decrease from the previous round)
No Apparent Trend
* Indicates an Area of Attainment or Remote Sampling well as described in the Performance Monitoring Evaluation Plan dated November 1993.
Notes:
1. All locations are approximate
2. Groundwater extraction from the overlying Lower Hopkinton stratum began on 18 November 1995.
Erler & Kalinowski, Inc.
PCE Concentrations (ug/L) Detected in Groundwater Samples from Blanding
Chemplex Site First OU
Clinton, Iowa
April 2004
EKI 893052.57
Figure 11


WEST REGION
EAST REGION
Point of Compliance Boundary
FARMERS ROAD
N
0
250
500
(Approximate Scale in Feet)
LEGEND
Upper Scotch Grove Extraction Well
Monitoring Well
Indicates an Area of Attainment or Remote Sampling Well as described in the Performance Monitoring Evaluation Plan dated November 1993.
Notes:
(a) All locations are approximate.
(b) All concentrations are in ug/L. Concentrations of non-PCE Chemicals measured in 2003 above cleanup goals are shown on this map.
(c) The remedial goal for each compound is shown in parentheses next to the compound's name.
(d) The screened formation for each well is shown in parentheses next to the Well ID:
USG = Upper Scotch Grove
LSG = Lower Scotch Grove
FC = Farmers Creek
LH = Lower Hopkinton
(e) Based on data validation performed during previous years, methylene chloride is likely a laboratory contaminant.
Erler & Kalinowski, Inc.
Concentrations of Chemicals Other than PCE Detected Above Cleanup Goals
Chemplex Site First OU
Clinton, Iowa
July 2003
EKI 890052.29
Figure 12



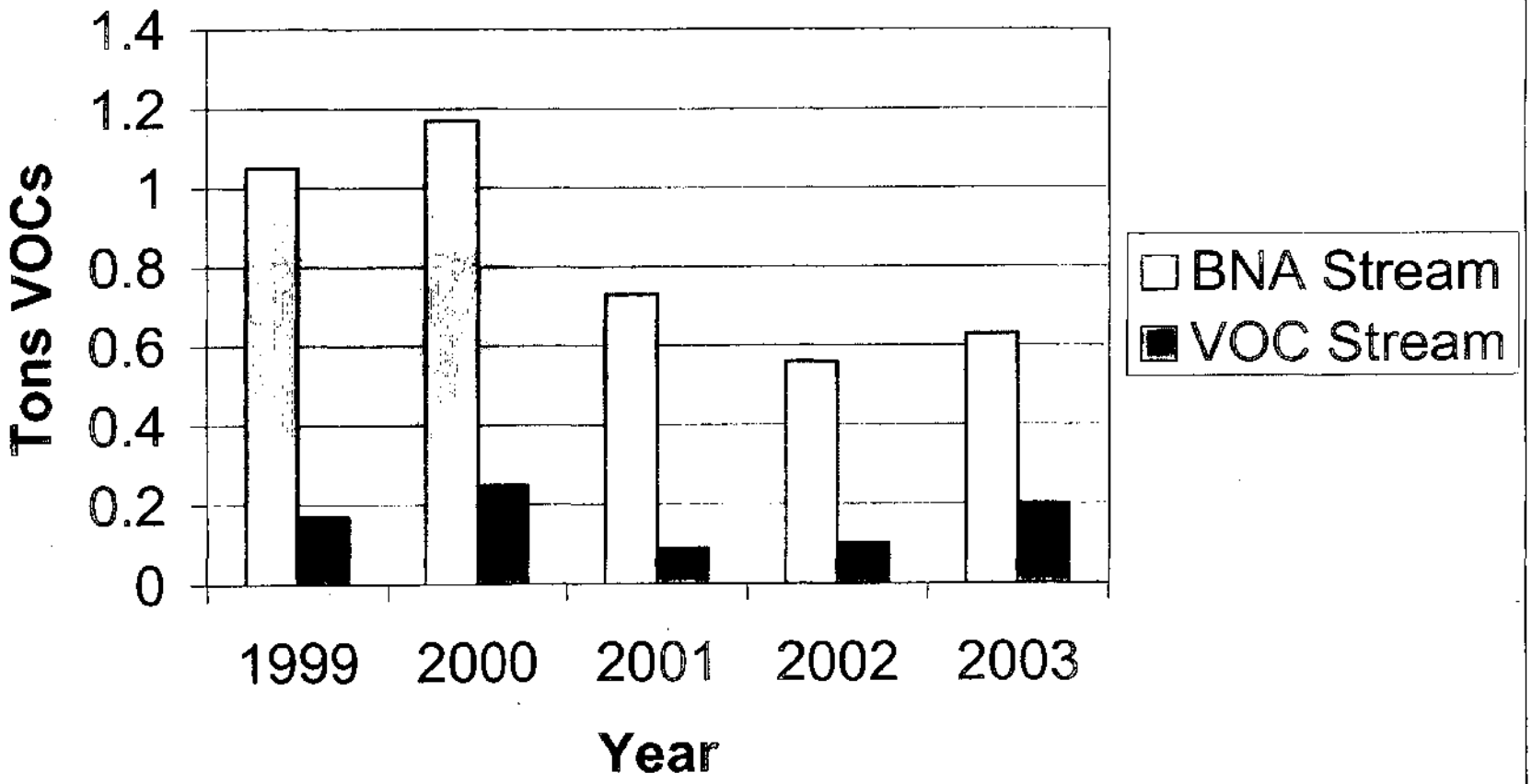
Notes:

Erler & Kalinowski, Inc.

Cumulative Mass Removal of Target Compounds by LGE System

Chemplex Site--OU-2
Clinton, Iowa
March 2004
EKI 890052.57
Figure 13

Figure 14
Total BNA and VOC Stream Emissions



Attachment A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

COPY

MAR 07 2002

RECEIVED
MAR 11 2002
ERLER & KALINOWSKI, INC.

Mr. Mark R. Hendrickson
Senior Staff
Texaco Inc.
P.O. Box 509
Beacon, NY 12508

Dear Mr. Hendrickson:

RE: Responses to EPA Comments on Previous Reports; and
Quarterly Progress Reports for October 1 through December 31, 2001
Chemplex Site, OU#1 and OU#2
Clinton, Iowa

The U.S. Environmental Protection Agency (EPA), Region VII, has completed review of the subject documents prepared by Erler & Kalinowski, Inc.(EKI) on behalf of ACC/GCC, dated January 31, 2002. Based on our review, we have the following comments that need to be addressed:

Review of Comments on ACC/GCC Response to EPA Comments

Comment 1: Response is noted. Historically there has not been a persistent Light, Nonaqueous Phase Liquids (LNAPL) layer at OU#1. It is recommended that the field observations for potential presence of LNAPL be continued and that ACC/GCC inform the EPA if the situation changes.

Comment 2: In the first bullet, please specify the time frame that will be used to collect samples. Also, Cal Lundberg of the Iowa Department of Natural Resources (IDNR) office in Des Moines should also be notified.

In the second bullet, the protocol appears reasonable. However, in the quarterly progress reports, it is recommended that the EPA be informed of any relatively major groundwater release, regardless of the mass of Volatile Organic Compound (VOCs) released.

Comment 3: The proposed method for calculating Landfill Gas Extraction (LGE) system operation times appears to be reasonable.

RECYCLE

Comment 4: Localized groundwater mounding occurs at the active LGE wells based on the data presented in the ACC/GCC response. Therefore, it is reasonable that those water level measurements collected from active LGE wells not be included in potentiometric maps of the perched groundwater system.

Comment 5: The response to this comment indicates that Perchloroethylene (PCE) concentration increases at LGE-23 may be due to groundwater PCE concentrations in the perched unit of the landfill. In the landfill perimeter, groundwater extraction wells are operational as part of the OU #1 remedial system, including wells LF-1 through LF-7.

- What are the concentrations of PCE that have been measured in those extraction wells?
- Is it reasonable to conclude that PCE concentrations in the landfill vapor are controlled primarily by groundwater PCE concentrations, or are there pockets of landfill materials that need to be further explored?
- Since a significant reliance is placed on the groundwater extraction system to remediate the landfill area, has a review on the extraction system operation in the landfill area been performed recently?
- Page 9 of 19 of your response discusses the 52% decrease in concentration of total target compounds in well LGE-23 as overall remedial progress. The goal of the Record of Decision (ROD) for the OU #2 LGE System is to remove more than 90% of the volatile organic compounds in the landfill area. It is recommended that enhancements be evaluated in this area of the LGE system to make more progress toward the 90% goal.

  I suggest that we discuss this prior to submittal of the next quarterly report.

Comments on 3rd Quarter OU #1 Quarterly Report

Comment 1: Gauging of Groundwater Levels - Response noted. The last paragraph on Page 13 of 19 states that "the lack of hydraulic control east of extraction wells EW-15a and EW-15b may not be the major cause of the migration of the PCE plume..." Have any other evaluations been performed to determine the cause of the plume migration?

Comments on 3rd Quarter OU #2 Quarterly Report

Comment 1: Response noted. No further comment.

Comment 2: Response noted. No further comment.

Comment 3: Response noted. No further comment.

Comment 4: Response noted. No further comment.

Comment 5: Response noted. No further comment.

Comments on 4th Quarter OU #1 Quarterly Report

Page 9 of 11 discusses the development and evaluation of potential recovery system enhancements. Pages 15 and 27 of the OU #1 Consent Decree Statement of Work discuss preparation and implementation of a Corrective Action Plan which is required when cleanup levels are being exceeded in new portions of the attainment area which appears to be happening in the southeast area of the site. It is recommended that this plan be prepared for EPA review prior to the meeting between EPA and ACC/GCC and that the date for this meeting be established. If possible, we should schedule this meeting in May of this year.

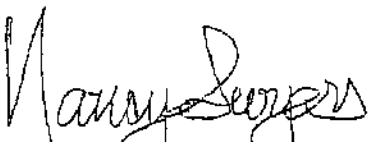
Comments on 4th Quarter OU #2 Quarterly Report

On page 6 of 11, explain how if CS-1 is not operating material is passed through CS-1 to CS-5.

On page 8 of 11, blower oil consumption is discussed. This section references a chart in Attachment B which summarizes oil additions. The report states that oil consumption was lower than in the previous quarter. However, it is not clear from review of this section and Attachment B that oil consumption is lower because the actual quantity of oil consumed is not discussed. It would be helpful to include the total capacity of oil stated in quarts for the Blower Unit. Also, future monthly operating reports should include the quantity of oil added in quarts and the total quantity of oil consumed.

If you have any questions concerning the above comments, you may contact me at (913) 551-7703.

Sincerely,



Nancy Swyers, P.E.
Remedial Project Manager
Iowa/Nebraska Branch
Superfund Division

cc: Thomas J. Belick, P.E., EKI
Calvin Lundberg, IDNR
Tom Nelson, contractor to CDM
Laura Splichal, CDM Federal Programs, Inc.

Attachment B

CLINTON COUNTY, IOWA
OFFICE OF RECORDER

7503-01 01 AUG 21 PM 1:56

FEE 86.00

RECORDER W. L. Wilke
by Patricia J. Milde
Deputy

Prepared by: Stephen D. Haufe, 408 So. 2nd St., Clinton, IA 242-1832

NOTICE OF ENVIRONMENTAL CLEANUP, ACCESS EASEMENT AND RESTRICTIVE COVENANTS

1. Equistar Chemicals, LP, a Delaware limited partnership; ACC Chemical Company, a Delaware corporation; and Getty Chemical Company, a Delaware corporation; are the owners of the constituent portions of the following real property located in Clinton County, Iowa, which is subject to the Consent Decrees referred to in this Notice:

A tract of land situated in Sections 19 and 20, Township 81 North, Range 6 East of the 5th P.M. described as commencing at an iron monument marking the Southeast Corner of said Section 19, said iron monument being located South 00° 01' East a distance of 33.0 feet from a concrete monument; thence North 89° 49' West, on the South Line of said Section 19, a distance of 1,323.0 feet to the East Sixteenth Line of said Section 19; thence North 00° 00' 30" West, on the said East Sixteenth Line of Section 19, a distance of 33.0 feet to a concrete monument; thence continuing North 00° 00' 30" West, on the last named course, a distance of 2611.8 feet to a concrete monument on the East-West Quarter Line of said Section 19; thence continuing North 00° 00' 30" West, on the last named course, a distance of 1,323.67 feet to a concrete monument on the North Sixteenth line of said Section 19 located South 00° 00' 30" East a distance of 1322 feet from the North Line of said Section 19; thence South 89° 39' East, along a line parallel with the said North Line of Section 19, a distance of 1323.17 feet to a concrete monument at the Southeast Corner of the Northeast Quarter of the Northeast Quarter of said Section 19; thence North 89° 56' East a distance of 605.76 feet to a concrete monument on the present West Right-of-Way Line of Camanche-Anamosa Road; thence continuing North 89° 56' East a distance of 112.7 feet to the original centerline of the old Camanche-Anamosa Road; thence South 53° 44' East, on the said original centerline of the old Camanche-Anamosa Road, a distance of 753.93 feet to a point on the West Sixteenth Line of said

Section 20; thence South 00° 01' West, on the said West Sixteenth Line of Section 20, a distance of 83.42 feet to a concrete monument on the said present West Right-of-Way Line of Camanche-Anamosa Road; thence continuing South 00° 01' West, on the last named course, a distance of 3,406.3 feet to a concrete monument located North 00°01' East a distance of 33.0 feet from the South Line of said Section 20; thence continuing South 00° 01' West, a distance of 33.0 feet to the said South Line of said Section 20; thence North 89° 58' 08" West on the South Line of said Section 20 a distance of 1,324.0 feet to the point of beginning; all located in Clinton County, Iowa; excluding all that land that lies North of the Easterly-Westerly extensions of the center line of 1st Avenue as monumented on the Northerly side thereof;

The above described property consists of a portion of the two real estate tracts conveyed by the City of Clinton, Iowa, to the above owners pursuant to Special Warranty Deeds recorded November 10, 1998, as Clinton County, Iowa Recorder Instrument Nos. 10028-98, and 10029-98, that portion of the above described property being owned solely by ACC Chemical Company and Getty Chemical Company, otherwise known as the Landfill Site, being more particularly described on Exhibit "A" attached to and incorporated herein by this reference, with the balance of the above described real property, excepting that described on Exhibit "A", being owned solely by Equistar Chemicals, LP.

2. Since 1968, the above described real property has been leased to various entities and used for operation of a polyethylene manufacturing facility. The property, together with certain adjacent and neighboring areas, is known as the Chemplex Site (the "Site").

3. Activities at the Site have resulted in the release and threatened release of hazardous substances and the contamination of soil and groundwater. As a result, the Site has become the subject of two actions filed by the United States of America pursuant to Sections 106 and 107 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended ("CERCLA" or "Superfund"), 42 U.S.C. 9606 and 9607. The United States in these actions sought environmental cleanup action by the City of Clinton, Iowa, and various of the entities which leased the Site.

4. In the first action, the United States, ACC Chemical Company, Four Star Oil and Gas Company, Primerica Holdings, Inc., Skelly Oil Corporation, Quantum Chemical Corporation and the City of Clinton were parties to a Consent Decree which was entered by the United States District Court for the Southern District of Iowa, Davenport Division, on November 7, 1991 (United States v. ACC Chemical Company, et al., 3-91-CV-70096). Pursuant to this Major Consent Decree (the "First Operable Unit" or "Groundwater" Consent Decree), the Settling Defendants agreed to implement a ground-water remediation program.

5. In the second action, the United States and certain of these entities, including ACC Chemical Company, Four Star Oil and Gas Company, The Travelers, Inc. (formerly Primerica Holdings, Inc.), Skelly Oil Corporation and Quantum Chemical Corporation entered into a Major Consent Decree, which was entered by the United States District Court for the Southern District of Iowa, Davenport Division, on February 6, 1995, (United States v. ACC Chemical Company et al., 3-91-CV-70096). Pursuant to this Major Consent Decree, the Settling Defendants will implement an environmental cleanup of the soils and debris at the Site. The major components of this remedial action for the second Operable Unit at the Site include:

(a) landfill gas extraction and capping in the Landfill Area of the Site;

(b) capping of a portion of the DAC Storage and Truck Loading Area of the Site;

(c) establishing and maintaining a vegetative cover in the Previous Basin Area, Former Waste Pile F and Surface Impoundments B and D;

(d) long-term monitoring and maintenance of cleanup measures in all areas of the Site.

6. In settlement of the second action, the United States and the City of Clinton also entered into a De Minimis Consent Decree, which was entered by the United States District Court for the Southern District of Iowa, Davenport Division, on February 6, 1995.

7. Subsequent to the Decrees referenced in paragraphs 4, 5, and 6 above, the City of Clinton, Iowa conveyed all of its interests in the property to the present owners Equistar Chemicals, LP, ACC Chemical Company, and Getty Chemical Company, pursuant to conveyances dated November 9, 1998, recorded November 10, 1998, referred to in paragraph 1 above.

8. Pursuant to the First Operable Unit (Groundwater) and De Minimis Decrees, Equistar Chemicals, LP, ACC Chemical Company, and Getty Chemical Company, hereby grant an access easement to the property to Four Star Oil and Gas Company, The Travelers, Inc. and Skelly Oil Company, as well as to the United States (including the U.S. Environmental Protection Agency), the State of Iowa, and their respective contractors and representatives, to such extent and at all such times as are necessary to carry out the provisions of the First Operable Unit (Groundwater) and Major Consent Decrees, including, but not limited to:

(a) performing and monitoring remedial work;

(b) verifying data and information submitted to the United States relating to contamination at or near the site;

(c) obtaining samples;

(d) assessing the need for planning of implementing additional response action at or near the Site.

This access easement shall run with the land and be binding on all subsequent owners of the real property described in paragraph 1 of this instrument.

9. Pursuant to the First Operable Unit (Groundwater) and De Minimis Consent Decrees, the following restrictions are also imposed on use of the above-described real property:

(a) a covenant prohibiting use of the property for other than industrial or commercial purposes;

(b) a covenant prohibiting construction, installation, maintenance or use of any wells on the property for the purpose of extracting water for human drinking purposes or the irrigation of food or feed crops, provided, however, that such restrictions shall not apply to existing wells numbers 1, 2, 4 and 6 used for potable water at the facility as now operated by Equistar Chemicals, LP, and as shown more specifically on the map attached hereto as Exhibit 1, Parcel A;

(c) a covenant prohibiting any excavation, drilling or similar intrusive activity which would disturb or interfere with the cap to be constructed and maintained in and adjacent to the Landfill Area of the Site. The Landfill Area of the Site is described on attached Exhibit "A", owned by ACC Chemical Company and Getty Chemical Company solely.

The foregoing restrictive covenants shall run with the land and be binding on all subsequent owners of the above-described real property.

10. Any portion of the described property may be freely conveyed, provided, however, that the deed or other instrument of conveyance shall contain access easements and restrictive covenants to the same effect as those set forth in the preceding paragraphs.

11. The access easements and the two restrictive covenants described in paragraph 9(b) and (c) of this instrument may be terminated or modified, in whole or in part, upon filing of a release executed by the U.S. Environmental Protection Agency and the owner of the property.

ACC CHEMICAL COMPANY

By: Roger K Hadley
Roger K. Hadley
Vice-President

EQUISTAR CHEMICALS, LP

By: _____
Joseph F. Brenner,
Clinton Plant Manager,
Authorized Signature

GETTY CHEMICAL COMPANY

By: Roger K Hadley
Roger K. Hadley
Vice-President

STATE OF IOWA]
-] ss:
COUNTY OF CLINTON]

On this 20th day of August, 2001, before me, the undersigned, a Notary Public in and for said State, personally appeared Joseph F. Brenner, to me personally known, who being by my duly sworn did say that he is the Plant Manager-Clinton of Equistar Chemicals, LP, a Delaware limited partnership, executing the foregoing instrument, that the instrument was signed on behalf of the said limited partnership by authority of its General Partners and Board of Directors, and that the said Joseph F. Brenner acknowledged execution of this instrument to be the voluntary act and deed of the limited partnership by it and by him voluntarily executed.

Dianne S. Steinhagen
NOTARY PUBLIC, State of Iowa
Commission Expires 2/10/03

STATE OF TEXAS]
] ss:
COUNTY OF HARRIS]

On this 14th day of August, 2001, before me, the undersigned Notary Public in and for the State of Texas, personally appeared Roger K. Hadley, to me personally known, who being by me duly sworn did say that he is a Vice-President of ACC Chemical Company, a Delaware corporation, executing the within and foregoing instrument; that no seal has been procured by the said corporation; that said instrument was signed on behalf of said corporation by authority of its Board of Directors; and that the said Roger K. Hadley as such officer acknowledged the execution of said instrument to be the voluntary act and deed of said corporation, by it and by him voluntarily executed.

LINDA R. CARRIERE
Notary Public, State of Texas
My Commission Expires 10-12-02

Linda R. Carriere
NOTARY PUBLIC, State of Texas
Commission Expires 10-12-02

STATE OF TEXAS]
] ss:
COUNTY OF HARRIS]

On this 14th day of August, 2001, before me, the undersigned Notary Public in and for the State of Texas, personally appeared Roger K. Hadley, to me personally known, who being by me duly sworn did say that he is a Vice-President of Getty Chemical Company, a Delaware corporation, executing the within and foregoing instrument; that no seal has been procured by the said corporation; that said instrument was signed on behalf of said corporation by authority of its Board of Directors; and that the said Roger K. Hadley as such officer acknowledged the execution of said instrument to be the voluntary act and deed of said corporation, by it and by him voluntarily executed.

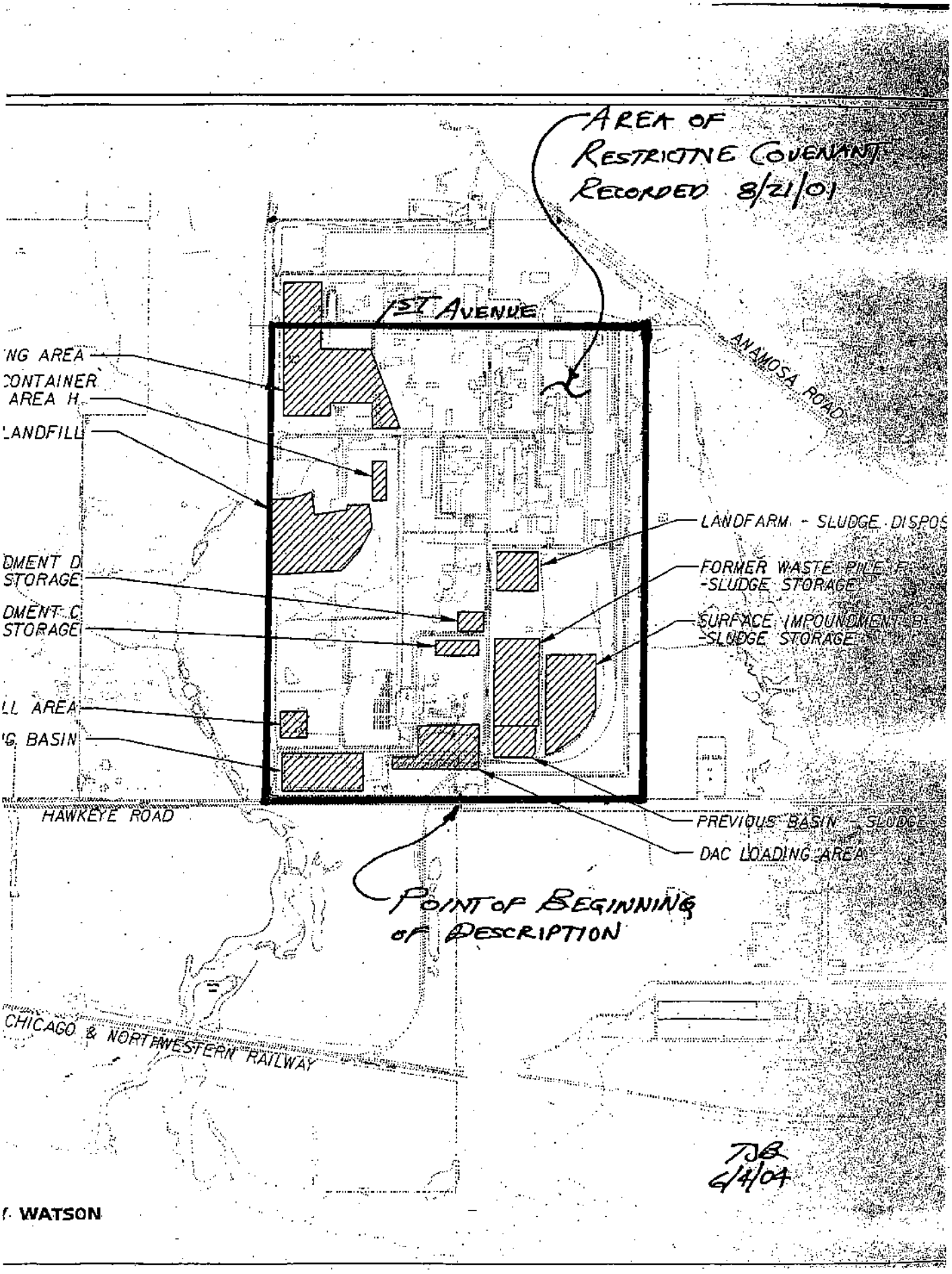
LINDA R. CARRIERE
Notary Public, State of Texas
My Commission Expires 10-12-02

Linda R. Carriere
NOTARY PUBLIC, State of Texas
Commission Expires 10-12-02

EXHIBIT A

A part of the East one-half of the Southeast quarter of Section 19, Township 81 North, Range 6, East of the 5th P.M., within the City of Clinton, Clinton County, Iowa, described as commencing as a point of reference at an existing monument marking the Southeast corner of said Section 19; thence North 00°01 West, along the East line of said Section 19, a distance of 50 feet to an iron rod stake on the North line of the existing public road, said iron rod stake being located 17 feet North from former Chemplex Monument Number 11; thence North 89°49' West, along the said North line of the public road, being parallel with the South line of said Section 19, a distance of 1323 feet to a point on the West line of the East one-half of the East one-half of said Section 19, located 17 feet North from Chemplex Monument Number 1; thence North 00°00'30" West, along the said West line of the East one-half of the East one-half of Section 19, a distance of 1473.39 feet to an iron rod stake marking the point of beginning of the land herein intended to be described; thence South 89°58'53" East, a distance of 320.60 feet to an iron rod stake; thence South 56°00'48" East, a distance of 167.80 feet to an iron rod stake; thence South 89°38'27" East, a distance of 132.50 feet to an iron rod stake; thence North 49°20'03" East, a distance of 251.68 feet to an iron rod stake; thence North 05°52'04" East, a distance of 332.59 feet to an iron rod stake; thence North 12°33'55" West, a distance of 159.24 feet to an iron rod stake; thence North 89°39'54" West, a distance of 247.00 feet to an iron rod stake; thence South 49°28'24" West, a distance of 74.11 feet to an iron rod stake; thence South 44°48'48" West, a distance of 38.64 feet to an iron rod stake; thence South 57°57'03" West, a distance of 20.62 feet to an iron rod stake; thence South 74°26'49" West, a distance of 13.36 feet to an iron rod stake; thence North 82°17'55" West, a distance of 29.29 feet to an iron rod stake; thence North 30°59'08" West, a distance of 21.80 feet to an iron rod stake; thence North 10°11'25" East, a distance of 182.42 feet to an iron rod stake; thence North 50°17'10" West, a distance of 61.50 feet to an iron rod stake; thence South 64°07'07" West, a distance of 230.07 feet to an iron rod stake; thence North 07°59'15" West, a distance of 152.28 feet to an iron rod stake on the said West line of the East one-half of the East one-half of Section 19; thence South 00°00'30" East, a distance of 609.77 feet to the point of beginning.

The Chemplex Monuments herein above referred to are shown on the Plat recorded as Instrument Number 6508-84, Office of the Clinton County, Iowa Recorder.


AREA OF
RESTRICTNE COVENANT
RECORDED 8/21/01
1ST AVENUE
ANAMOSA ROAD
NG AREA
CONTAINER
AREA H
LANDFILL
LANDFARM - SLUDGE DISPOS
DMENT D
STORAGE
FORMER WASTE PILE F
-SLUDGE STORAGE
DMENT C
STORAGE
SURFACE IMPOUNDMENT B
-SLUDGE STORAGE
LL AREA
G BASIN
HAWKEYE ROAD
PREVIOUS BASIN - SLUDGE
DAC LOADING AREA
POINT OF BEGINNING
OF DESCRIPTION
CHICAGO & NORTHWESTERN RAILWAY
JJB
6/4/04
WATSON

Attachment C

THE UNIVERSITY OF IOWA

April 1, 2002

Ms. Nancy Swyers
EPA Region VII
901 N. 5th Street
Kansas City, KS 66101

Dear Ms. Swyers:

Enclosed is a copy of the letter I sent to Mr. Bob Summers, Clinton County Sanitarian, summarizing the detects from the results of analyses for the Clinton County Groundwater Monitoring Project. These samples were collected March 12, 2002.

Please give me a call if you have any questions about these results.

Sincerely,

M. Lynn Hudachek

M. Lynn Hudachek
Program Associate

Enclosure

HYGIENIC LABORATORY

102 Oakdale Campus, #H101 OH
Iowa City, Iowa 52242-5002
319/335-4500

Iowa's Environmental and Public Health Laboratory

FAX: 319/335-4555
http://www.uhl.uiowa.edu

THE UNIVERSITY OF IOWA

April 1, 2002

Mr. Bob Summers
Clinton County Sanitarian
329 East 11th Street
DeWitt, IA 52742-1416

Dear Bob:

Following is a summary of results from the Clinton County Groundwater Monitoring Project samples collected March 12, 2002. I also mailed each individual their respective analytical report.

SODIUM - Sodium is a naturally occurring element in the earth and all levels detected in the following samples are considered normal background concentrations in most midwestern groundwater supplies.

Location	UHL Sample ID#	Concentration (ppm)
L. Arns	200201440	16.0
L. Bandixen	200201443	6.5
Decker	200201446	22.0
J. Bark	200201442	4.3
S. Bark	200201441	130.0
R. Bierly	200201433	29.0
L. Foley	200201432	5.6
L. Goldbeck	200201434	200.0
L. Huizenga	200201436	14.0
E. LeDoux	200201437	19.0
C. LeQue	200201435	12.0
A. Murphy	200201444	5.5
J. Payne	200201438	22.0
J. Pieczynski	200201453	21.0
T. Sachsenmaier	200201439	3.7
L. Todtz	200201447	4.4

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RADON - Radon is a naturally occurring gas. At the present time EPA proposed MCL for radon is 300 pCi/L. The health risks associated with radon come from breathing air containing high levels of radon gas. The risk of having radon in your water is not from drinking the water. When water is used for drinking, cooking, washing, etc., the gas is released into the air.

Location	UHL Sample ID#	Concentration (pCi/L)
L. Arns	200201440	331*
L. Bandixen	200201443	45
Decker	200201446	131
J. Bark	200201442	91
S. Bark	200201441	210
R. Bierly	200201433	153
J. Bousman	200201449	140
L. Foley	200201432	256
J. Gluesing	200201451	350*
L. Goldbeck	200201434	260
E. LeDoux	200201437	641*
C. LeQue	200201435	257
L. Munck	200201448	338*
A. Murphy	200201444	91
J. Payne	200201438	245
J. Pieczynski	200201453	311*
T. Sachsenmaier	200201439	162
J. Thomas	200210445	241
L. Todtz	200201447	114
A. VanZee	200201452	91
J. Wisor	200201450	201

*These samples were above the proposed 300 pCi/L for radon in drinking water. If you would like further information about radon you can call the Iowa Department of Public Health's radon information line at 1-800-383-5992.

COPPER - The EPA's action level for copper in drinking water is 1.3 ppm. None of the samples analyzed during this sample period exceeded this level.

Location	UHL Sample ID#	Concentration (ppm)
J. Gluesing	200201451	0.01
A. VanZee	200201452	0.02
J. Wisor	200201450	0.01

ZINC - The suggested guideline for zinc under EPA's secondary drinking water standards is 5 ppm. Zinc was detected in the following samples, however, none of the samples analyzed during this sampling period exceeded the 5 ppm level.

Location	UHL Sample ID#	Concentration (ppm)
J. Bousman	200201449	0.07
J. Gluesing	200201451	0.18
J. Wisor	200201450	0.13

LEAD - The EPA's action level for lead in drinking water is 0.015 ppm. The sample noted below is above this action level. Often leaching of lead from corroded plumbing is the source of lead found in drinking water. Usually letting the water run to flush the water sitting in the pipes before drinking or cooking alleviates or reduces the lead in your water and your chances of ingesting this metal.

Location	UHL Sample ID#	Concentration (ppm)
J. Gluesing	200201451	0.07

ARSENIC The EPA's Maximum Contaminant Level (MCL) for arsenic in drinking water is 0.05 ppm. None of the samples analyzed during this sample period exceeded this level.

Location	UHL Sample ID#	Concentration (ppm)
L. Huizenga	200201436	0.02

TRICHLOROETHYLENE -

The Maximum Contaminant Level (MCL) for TC
EPA's Safe Drinking Water Act guidelines.
The chromatographic profiles for the Foley and
presence of TCE below the quantitation limit
measure the concentration.

L. Huizenga
Dick Hook
1013 31st Ave.

As always, thank you for your help and support with this samplir

Sincerely,

Lynn

M. Lynn Hudachek
Grants to Counties Coordinator

THE UNIVERSITY OF IOWA

April 16, 2002

Mr. Bob Summers
Clinton County Sanitarian
329 East 11th Street
DeWitt, IA 52742-1416

Dear Bob:

Following is a summary of results from the Thompson well that you collected on April 1, 2002, as part of the Clinton County Groundwater Monitoring Project. I also mailed Mr. Thompson a copy of his full analytical report.

Sodium was detected at 13 ppm.

Radon was detected at 510 pCi/L. This level is higher than the proposed drinking water standard of 300 pCi/L. I suggested to him that he test his indoor air for radon and that he call the Iowa Department of Public Health's radon information line at 1-800-383-5992 for more information.

Trichloroethylene was observed in this sample below our quantitation limit of 0.5 ppb, which means that a trace amount was detected, but it was at a level below what we could accurately measure.

If you have any questions about these results please give me a call. Thank you.

Sincerely,

Lynn

M. Lynn Hudachek
Grants to Counties Coordinator

HYGIENIC LABORATORY

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Iowa City, Iowa 52242-5002
319/335-4500

Iowa's Environmental and Public Health Laboratory

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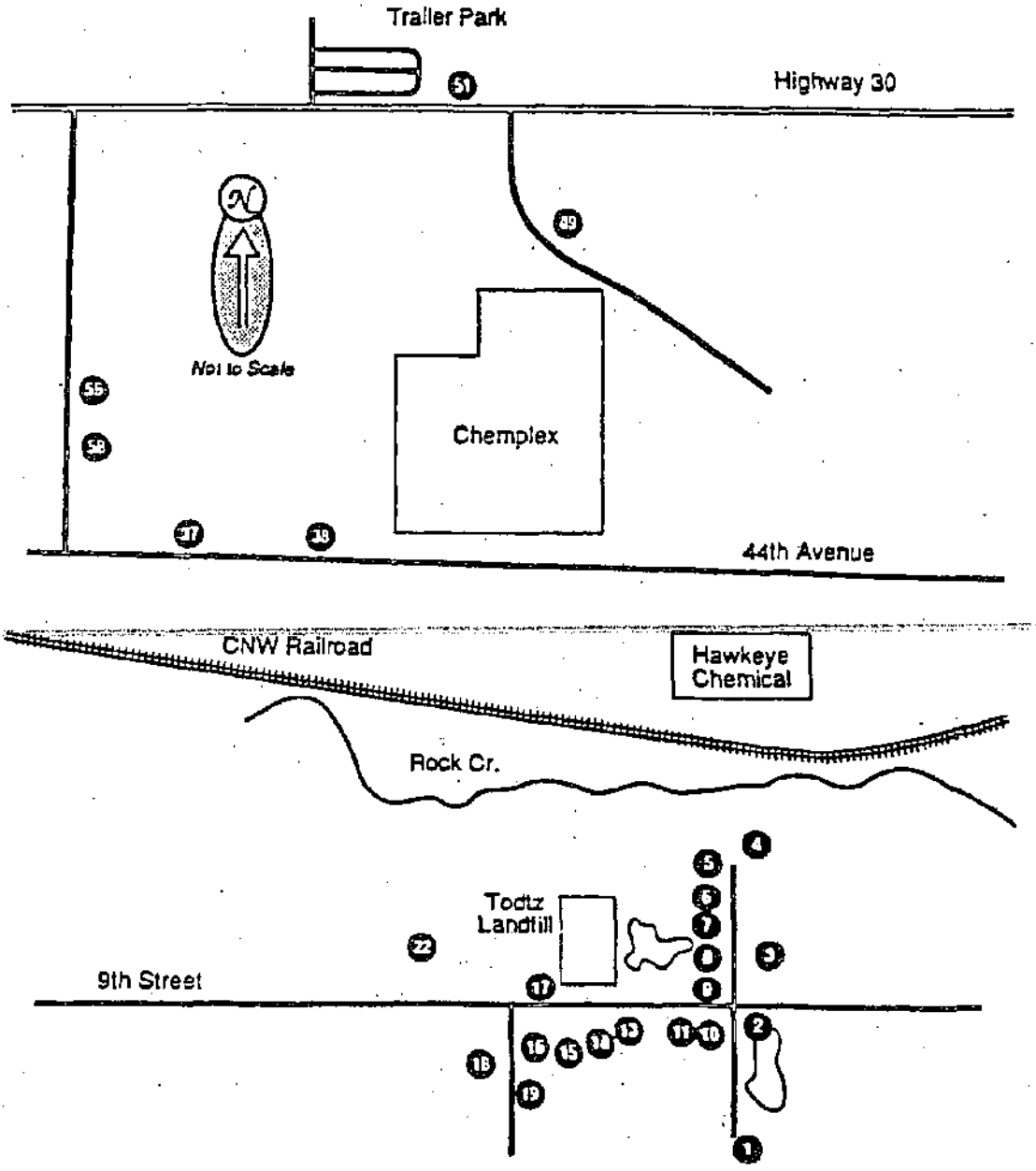
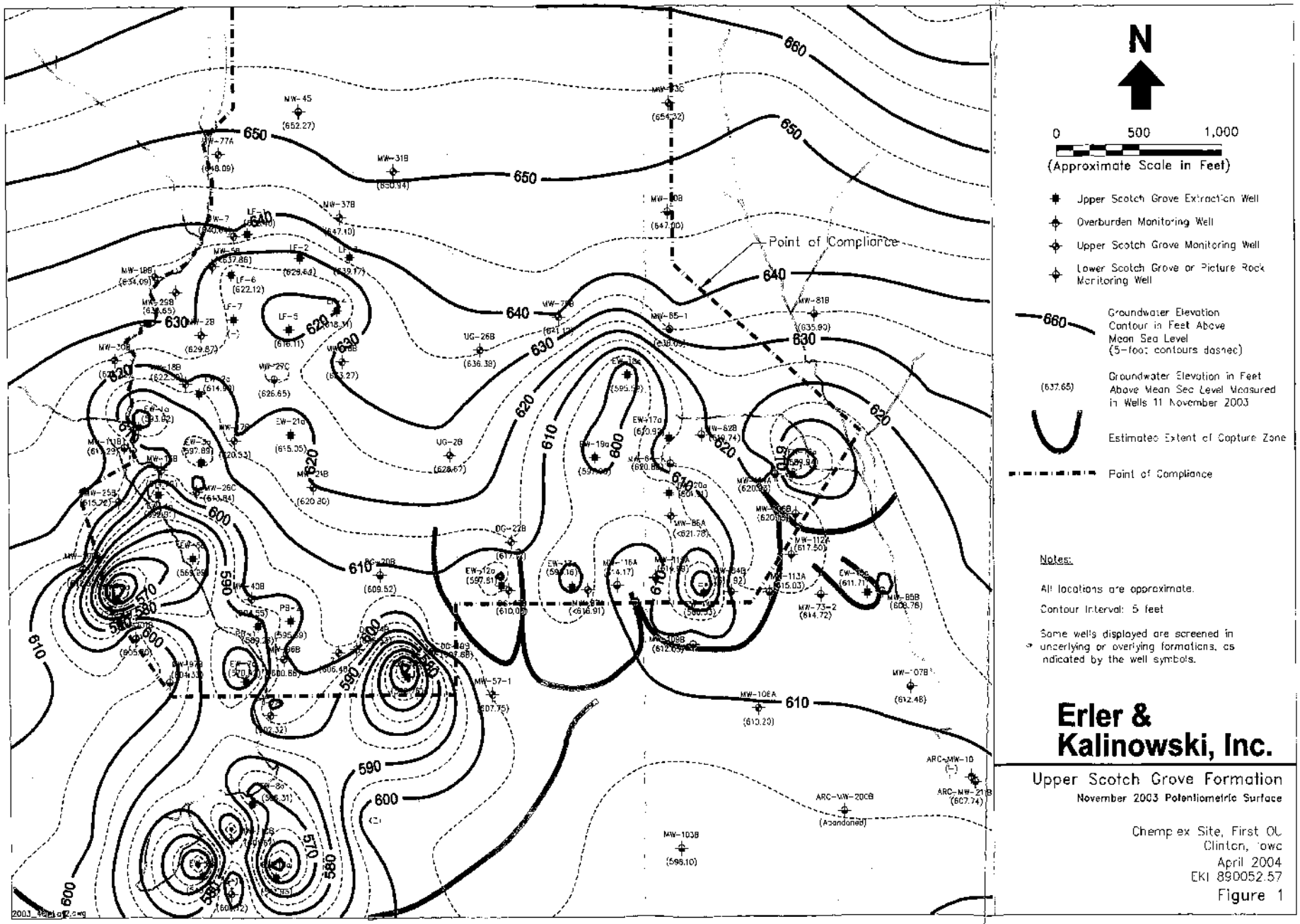
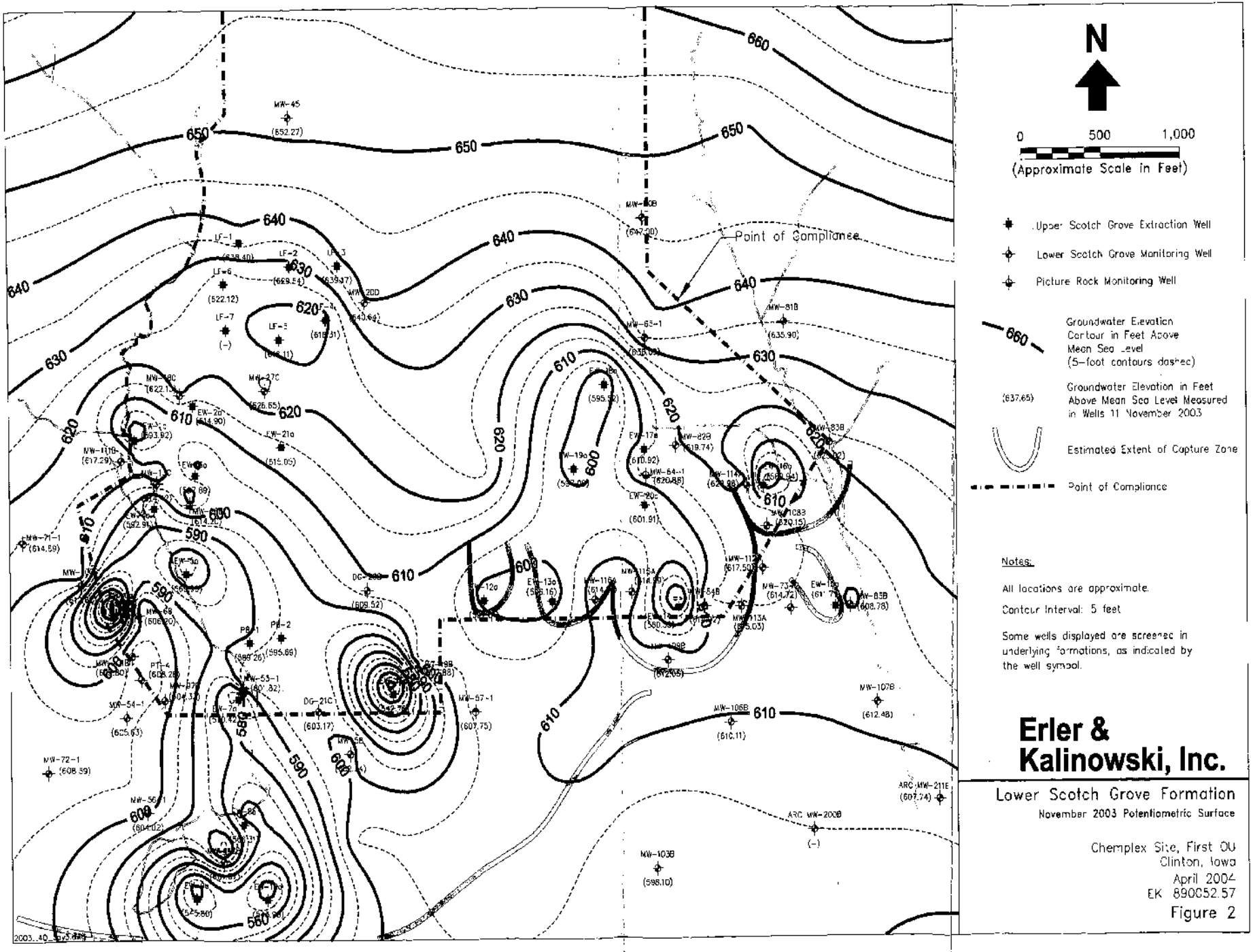


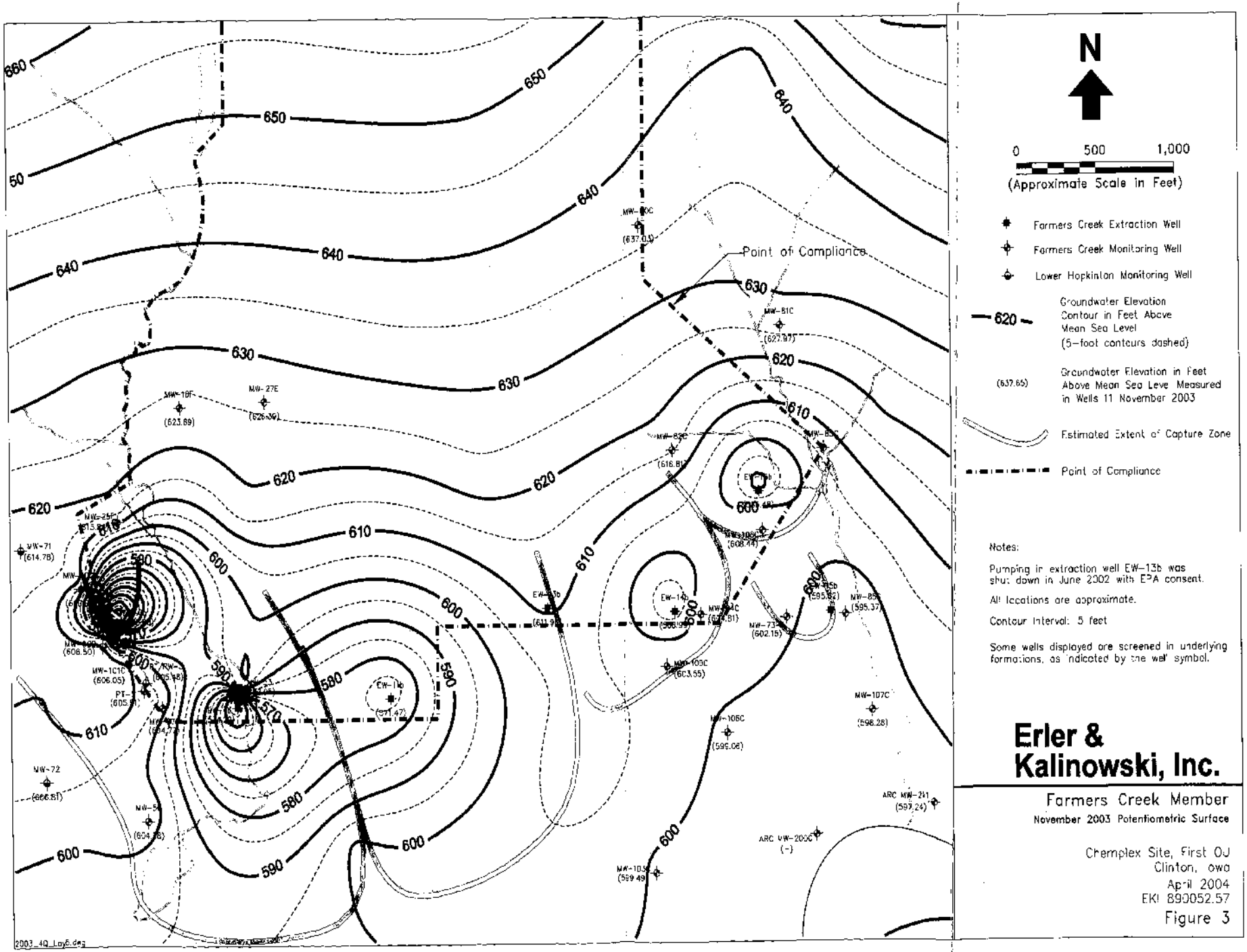
Figure 5-1 **Sampling Locations**

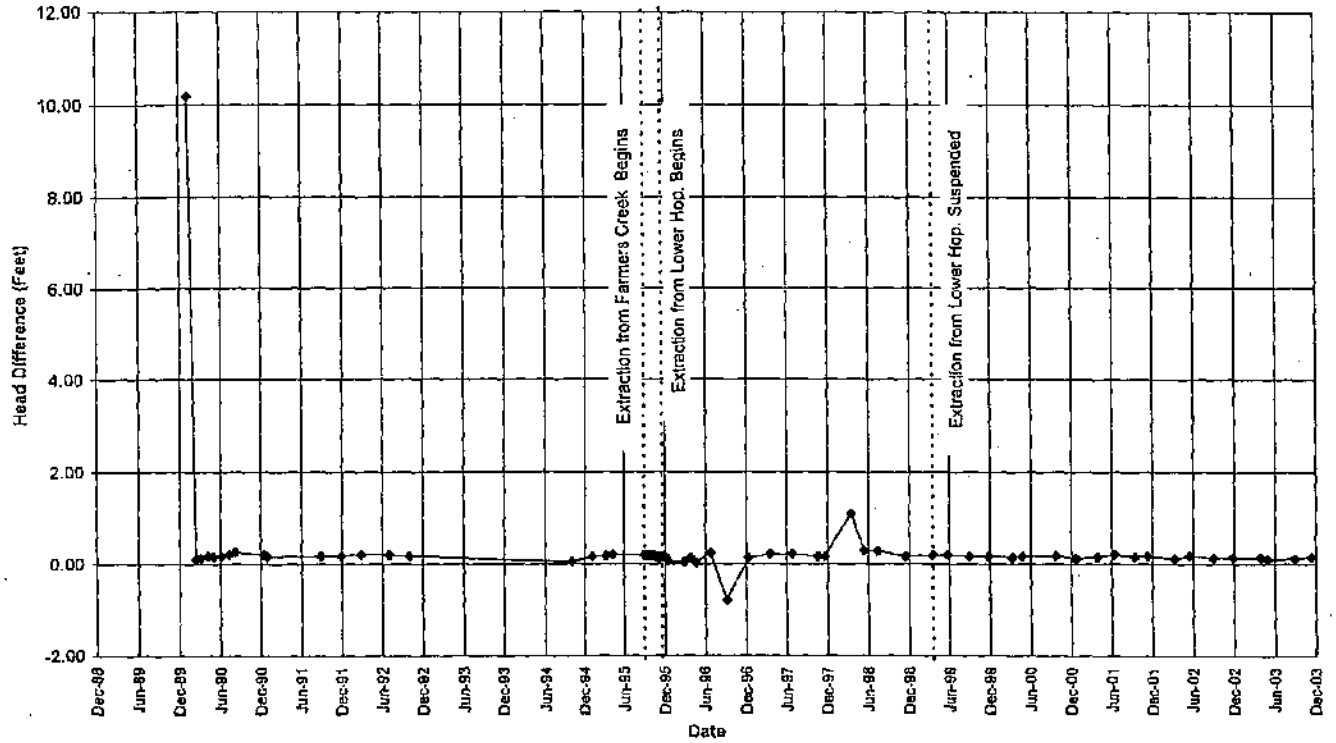
UHL/graphics

Attachment D


N
0
500
1,000
(Approximate Scale in Feet)
Upper Scotch Grove Extraction Well
Overburden Monitoring Well
Upper Scotch Grove Monitoring Well
Lower Scotch Grove or Picture Rock Monitoring Well
660
Groundwater Elevation Contour in Feet Above Mean Sea Level (5-foot contours dashed)
(637.65)
Groundwater Elevation in Feet Above Mean Sea Level Measured in Wells 11 November 2003
Estimated Extent of Capture Zone
Point of Compliance
Point of Compliance
Notes:
All locations are approximate.
Contour Interval: 5 feet
Some wells displayed are screened in underlying or overlying formations, as indicated by the well symbols.
Erler & Kalinowski, Inc.
Upper Scotch Grove Formation
November 2003 Potentiometric Surface
Chemplex Site, First St.
Clinton, Iowa
April 2004
EKI 890052.57
Figure 1


N
0
500
1,000
(Approximate Scale in Feet)
Upper Scotch Grove Extraction Well
Lower Scotch Grove Monitoring Well
Picture Rock Monitoring Well
660
Groundwater Elevation Contour in Feet Above Mean Sea Level (5-foot contours dashed)
(637.65)
Groundwater Elevation in Feet Above Mean Sea Level Measured in Wells 11 November 2003
Estimated Extent of Capture Zone
Point of Compliance
Point of Compliance
Notes:
All locations are approximate.
Contour Interval: 5 feet
Some wells displayed are screened in underlying formations, as indicated by the well symbol.
Erler & Kalinowski, Inc.
Lower Scotch Grove Formation
November 2003 Potentiometric Surface
Chemplex Site, First OU
Clinton, Iowa
April 2004
EK 890052.57
Figure 2


N
0
500
1,000
(Approximate Scale in Feet)
Farmers Creek Extraction Well
Farmers Creek Monitoring Well
Lower Hopkinton Monitoring Well
620
Groundwater Elevation Contour in Feet Above Mean Sea Level (5-foot contours dashed)
(637.65)
Groundwater Elevation in Feet Above Mean Sea Leve Measured in Wells 11 November 2003
Estimated Extent of Capture Zone
Point of Compliance
Point of Compliance
Notes:
Pumping in extraction well EW-13b was shut down in June 2002 with EPA consent.
All locations are approximate.
Contour Interval: 5 feet
Some wells displayed are screened in underlying formations, as indicated by the well symbol.
Erler & Kalinowski, Inc.
Farmers Creek Member
November 2003 Potentiometric Surface
Chemplex Site, First OU
Clinton, Iowa
April 2004
EKI 890052.57
Figure 3
2003_4Q_Lay6.dsg



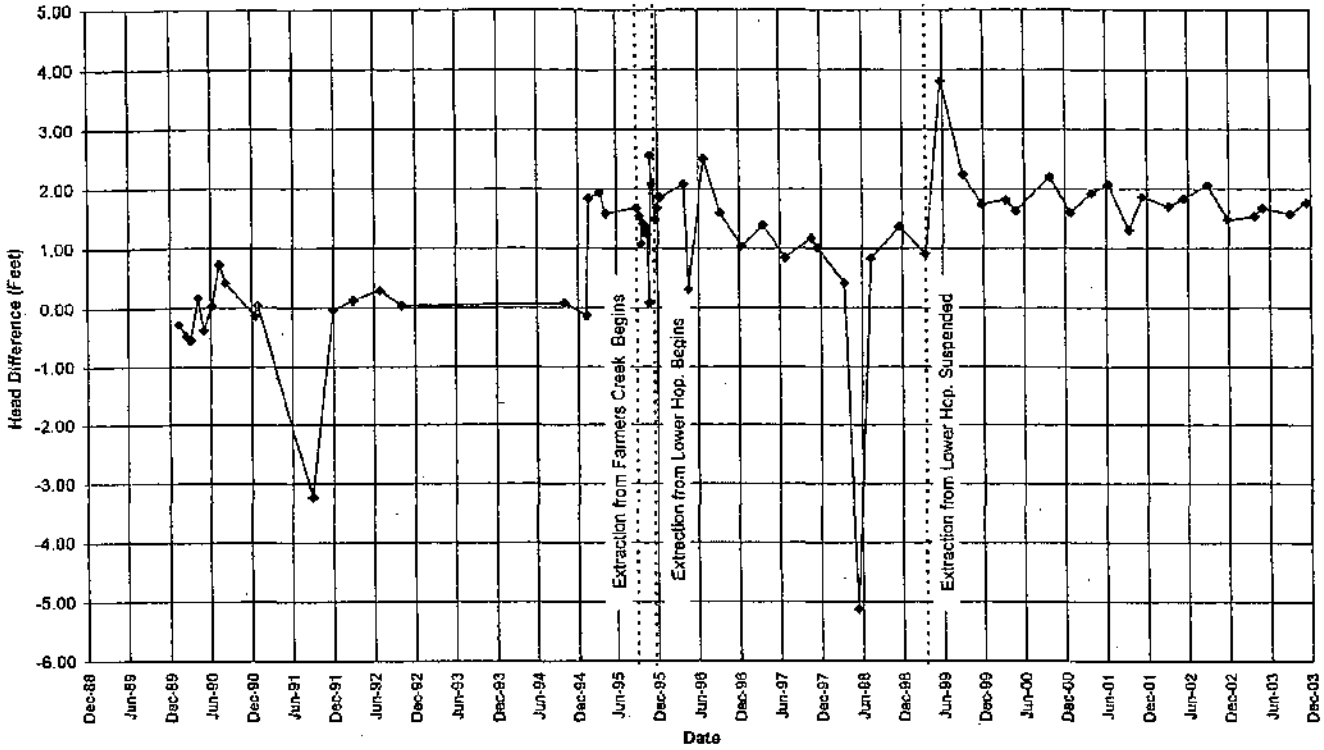
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-13C and Picture Rock well MW-13D. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-13C/MW-13D

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-4



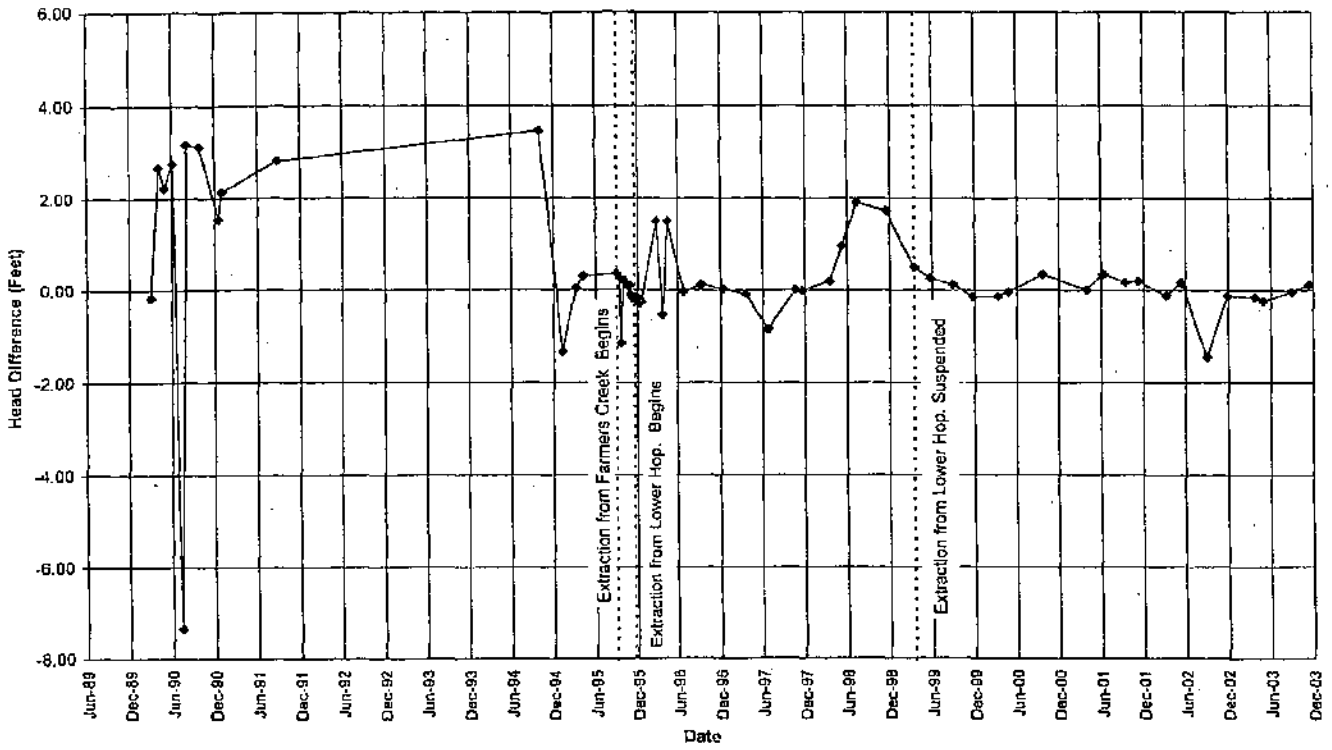
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-18C and Farmers Creek well MW-18F. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-18C/MW-18F

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-5



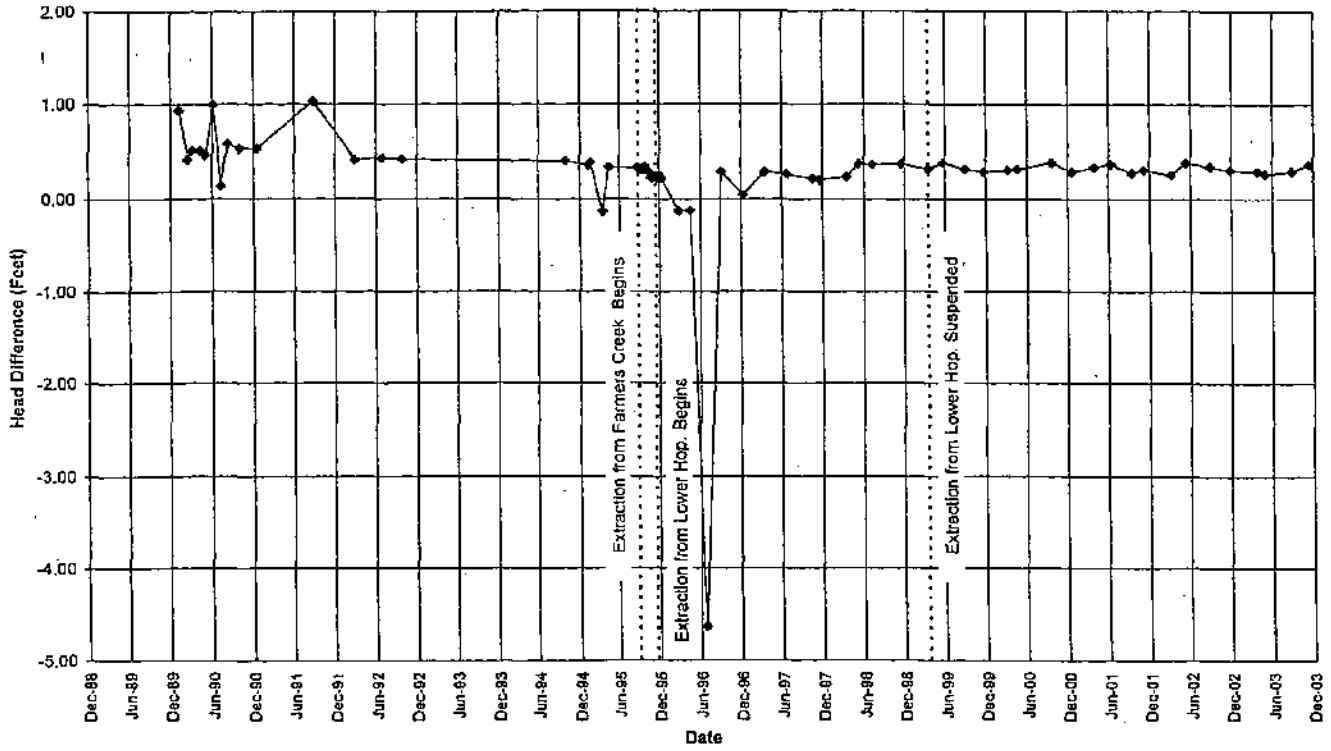
Notes:

1. Head difference shown is the difference between the groundwater elevation at Upper Scotch Grove well MW-25B and Farmers Creek well MW-25F. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-25B/MW-25F

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-6



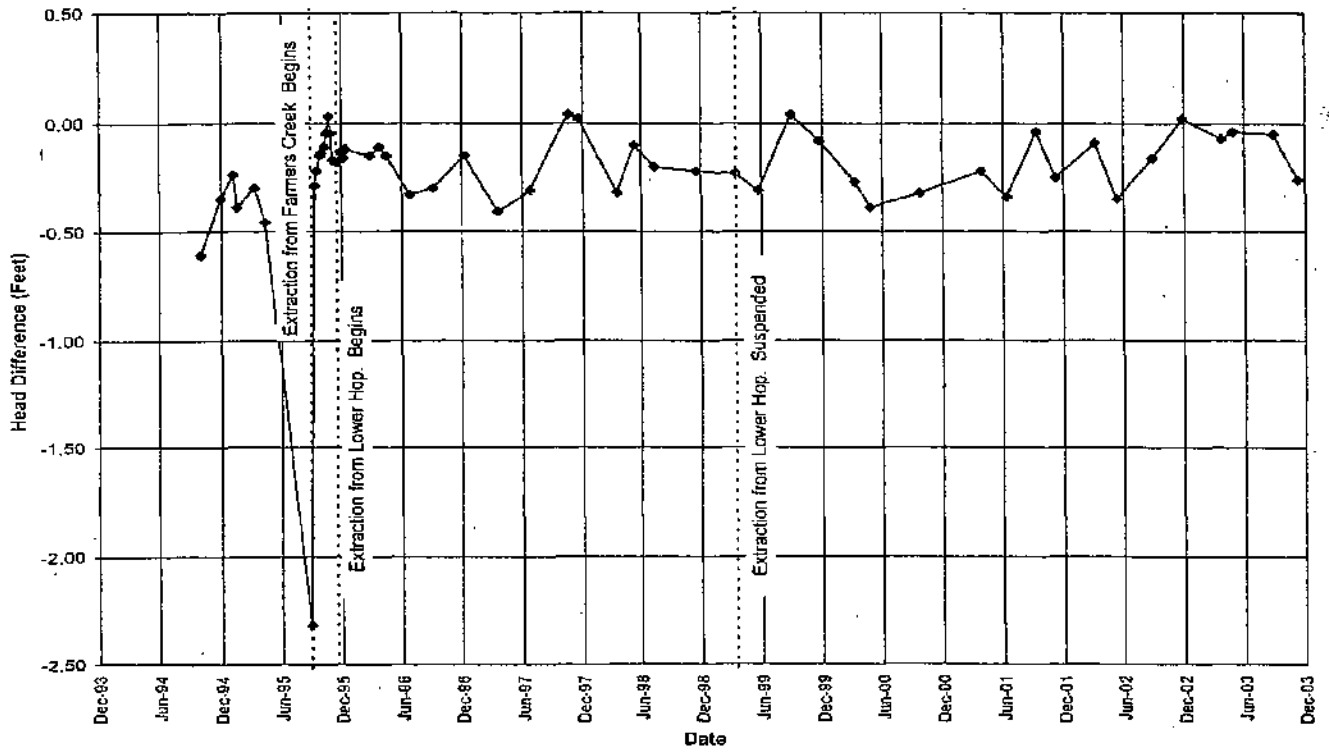
Notes:

1. Head difference shown is the difference between the groundwater elevation at Upper Scotch Grove well MW-26C and Picture Rock well MW-26E. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-26C/MW-26E

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-7



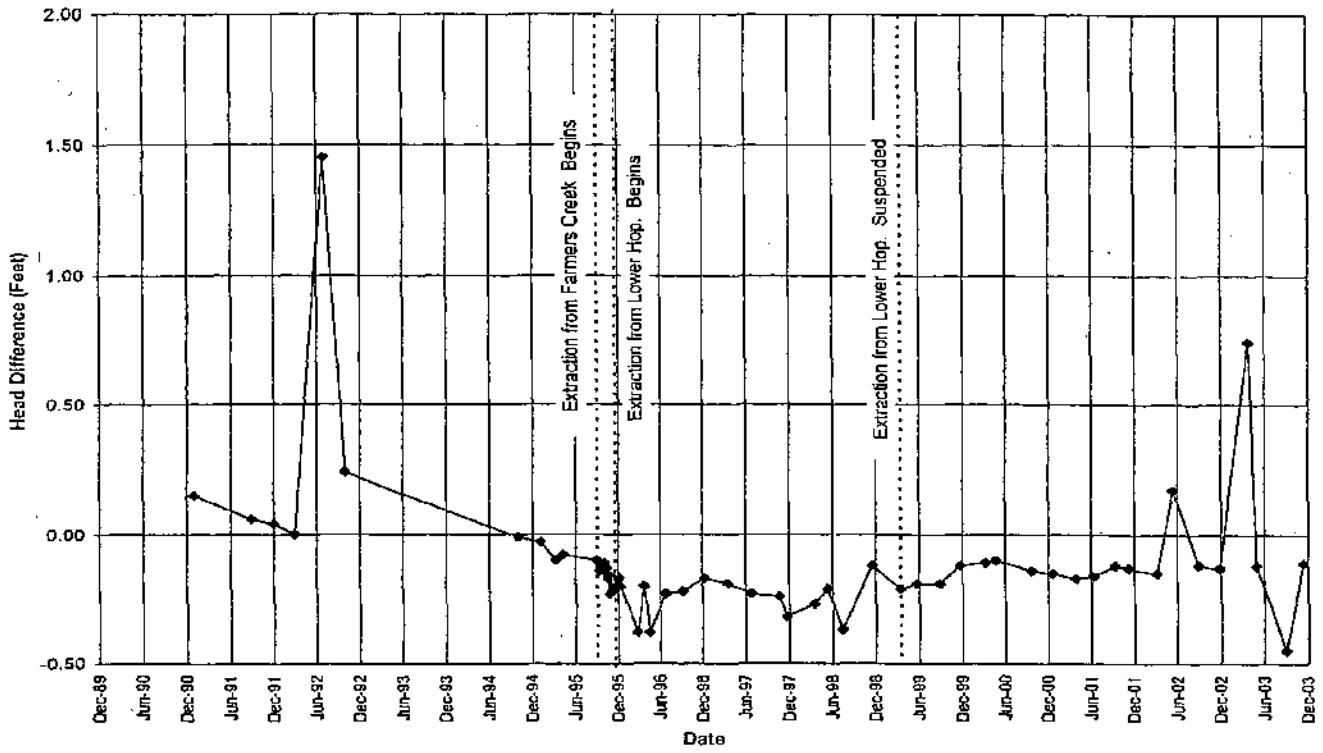
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-27C and Farmers Creek well MW-27E. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-27C/MW-27E

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-8



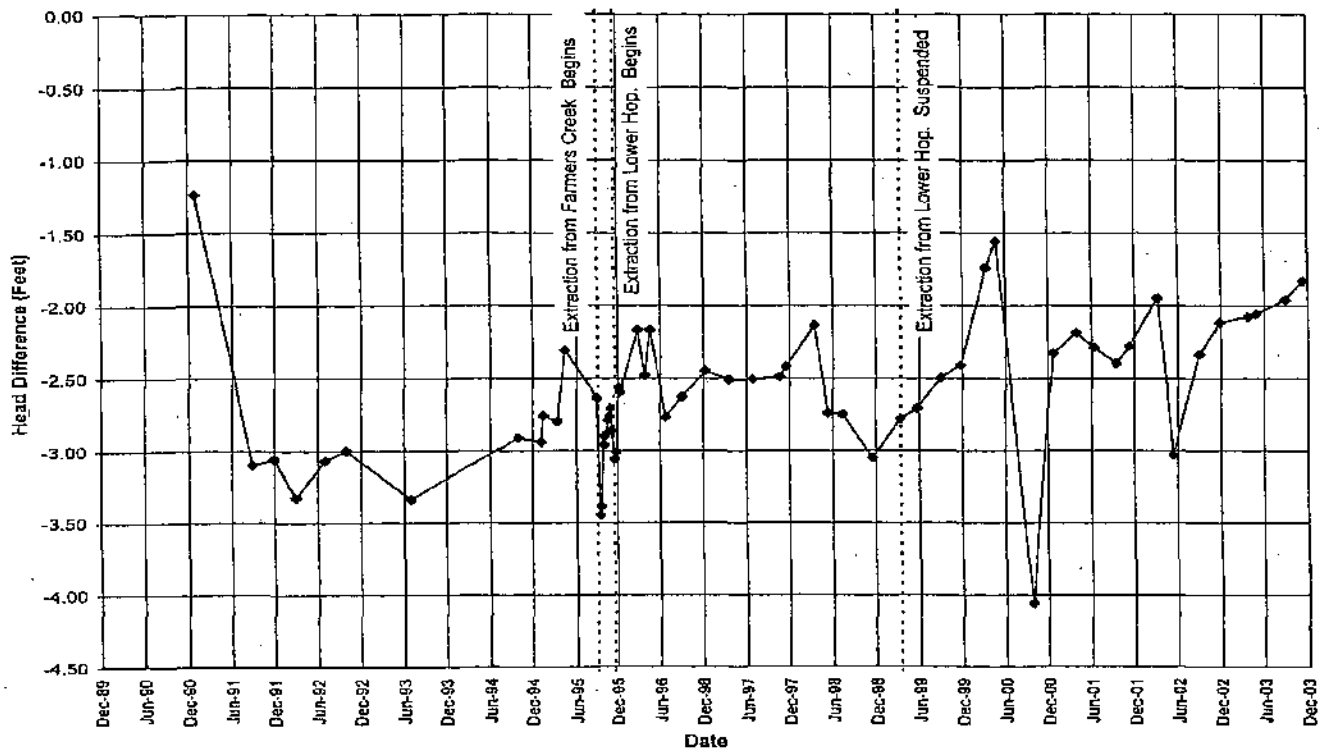
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-71-1 and Lower Hopkinton well MW-71. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-71-1/MW-71

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-9



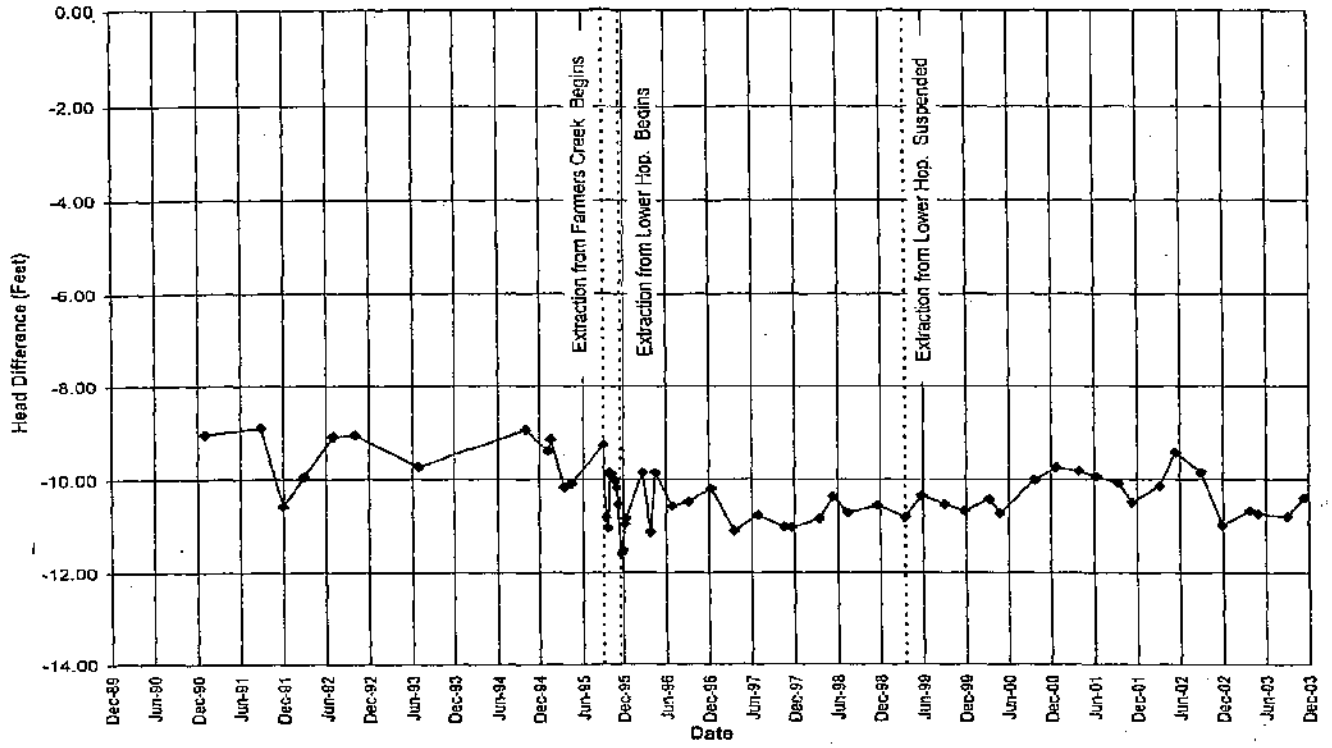
Notes:

1. Head difference shown is the difference between the groundwater elevation at Picture Rock well MW-64-1 and Blanding well MW-64. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in
East Region Monitoring Well Pair
MW-64-1/MW-64

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-10



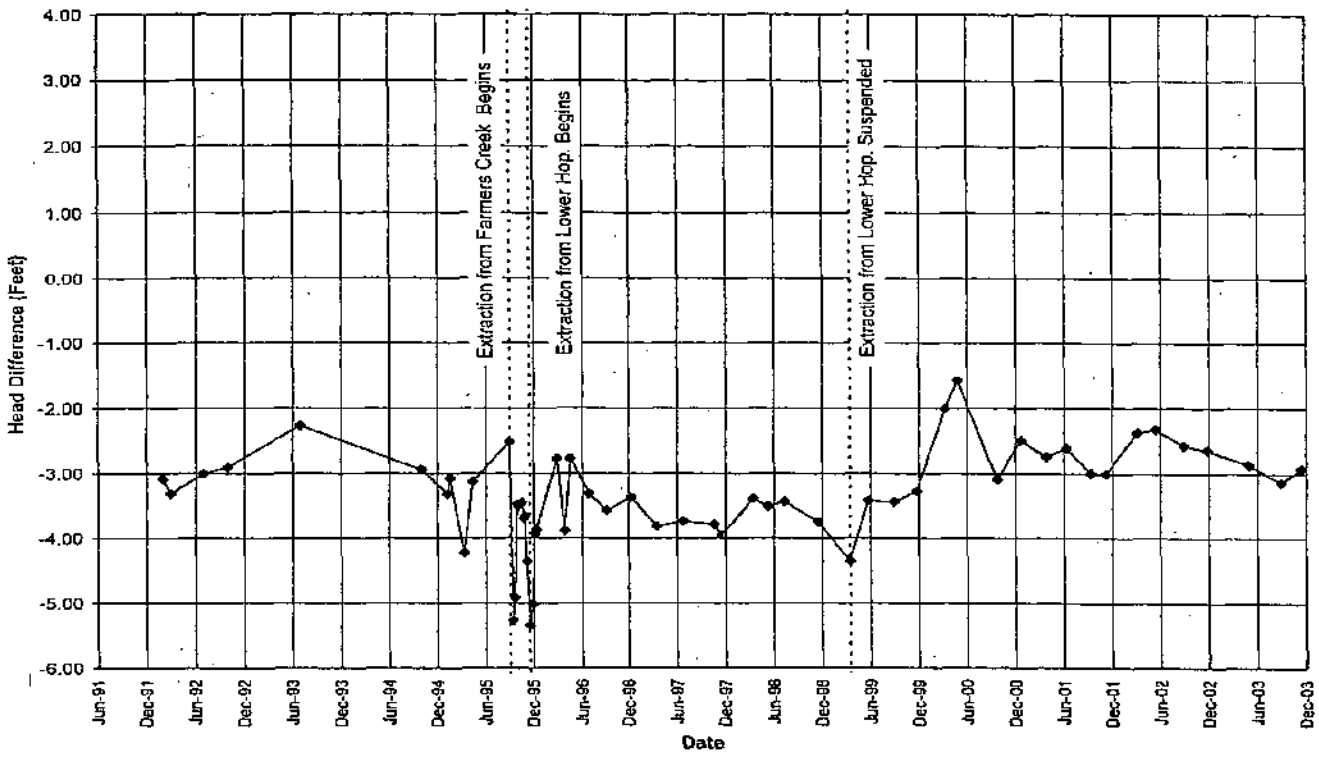
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-65-1 and Blanding well MW-65. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in East Region Monitoring Well Pair MW-65-1/MW-65

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-11



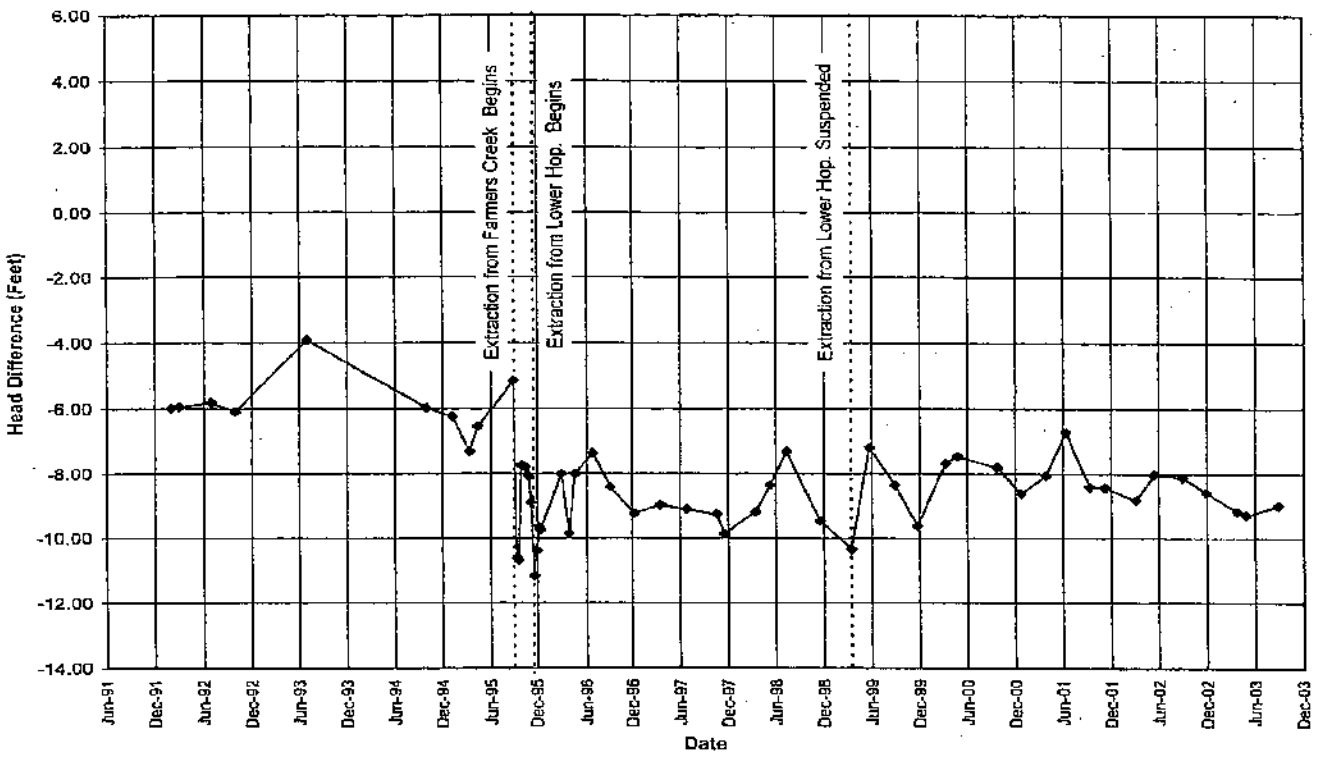
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-82B and Farmers Creek well MW-82C. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in East Region Monitoring Well Pair MW-82B/MW-82C

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-12



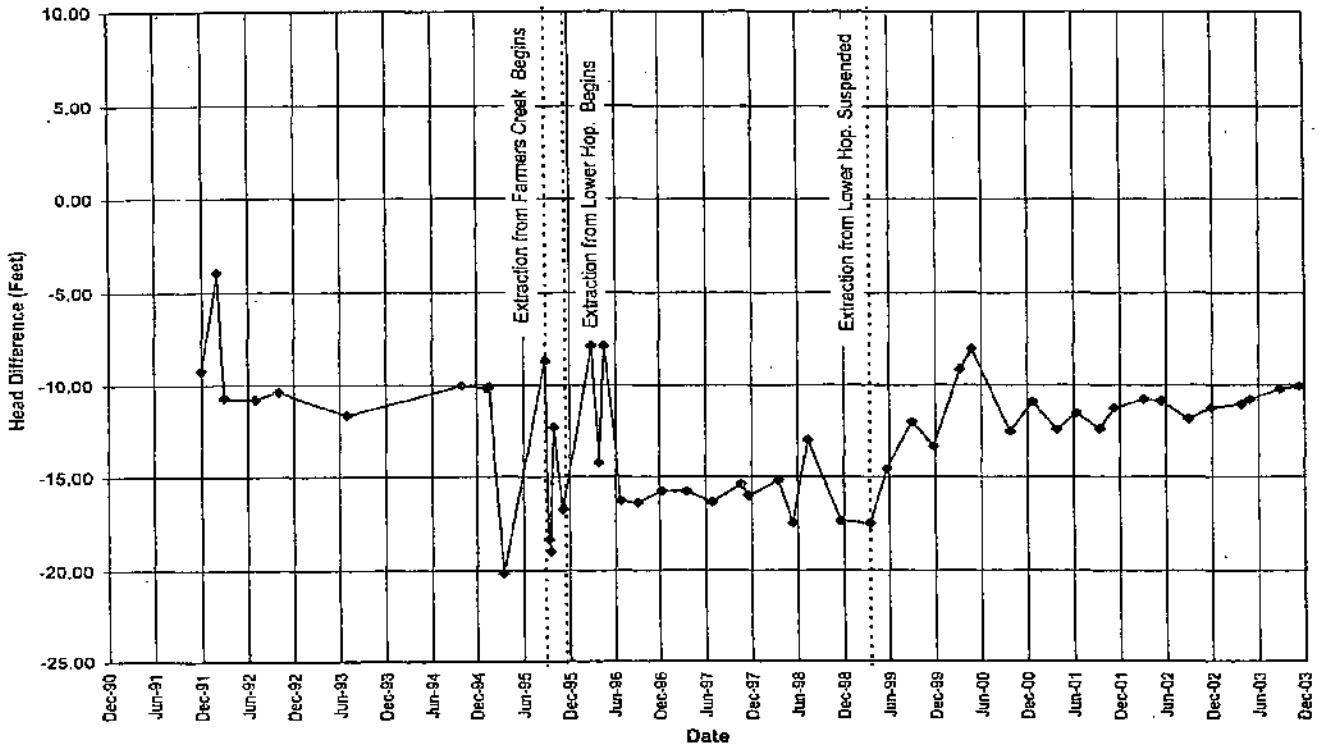
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-83B and Farmers Creek well MW-83C. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in East Region Monitoring Well Pair MW-83B/MW-83C

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-13



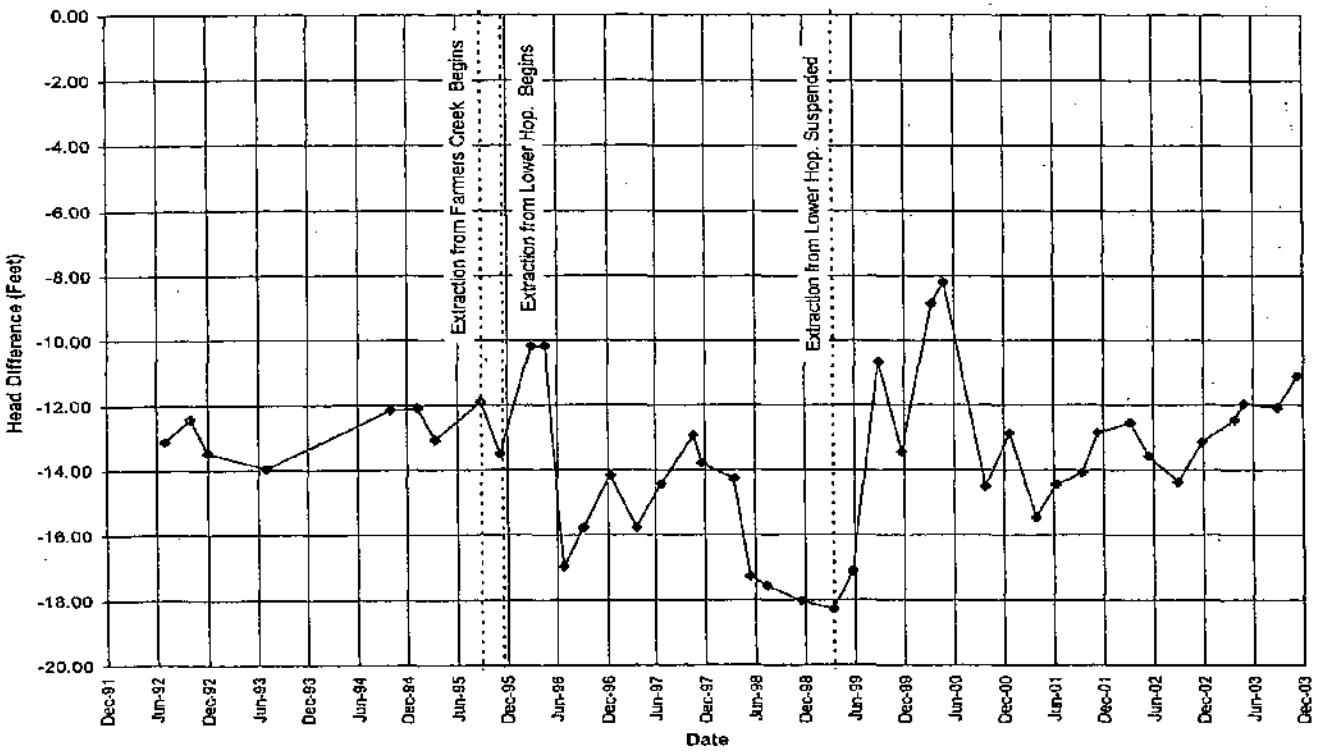
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-84B and Farmers Creek well MW-84C. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in East Region Monitoring Well Pair MW-84B/MW-84C

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-14



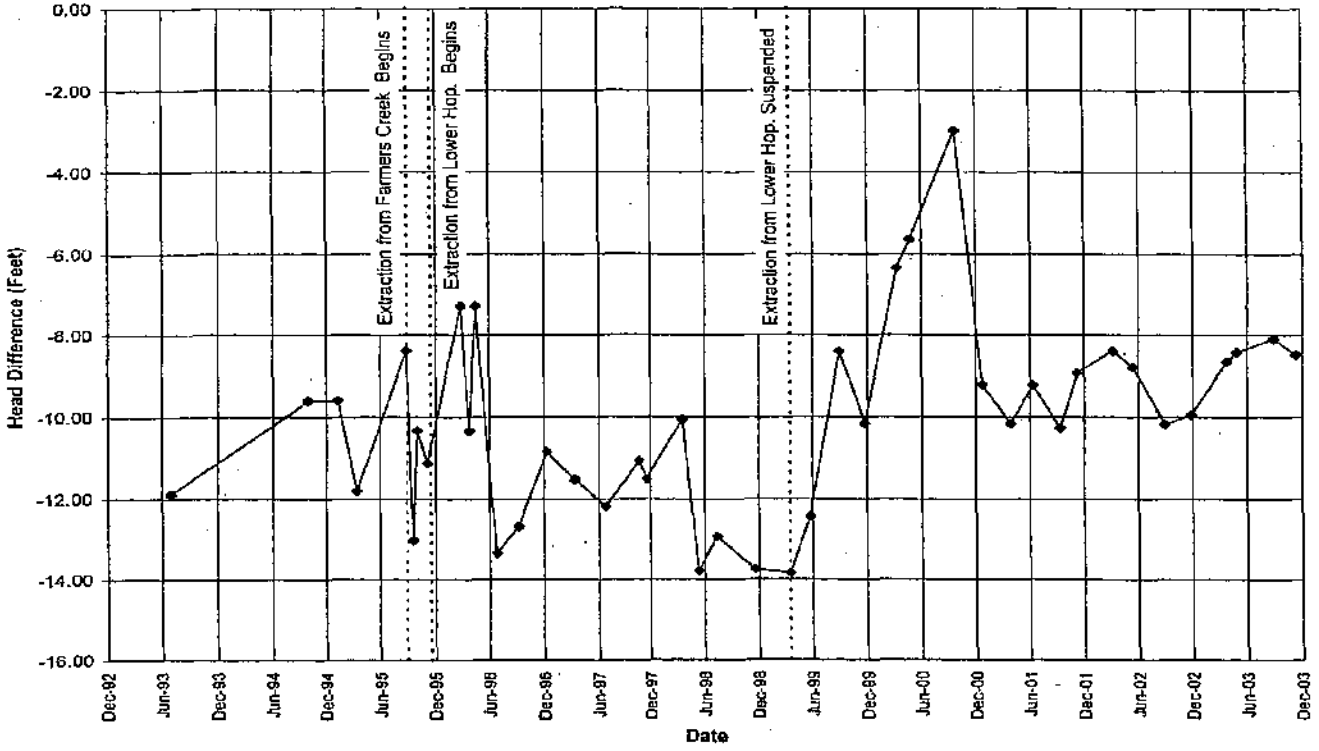
Notes:

1. Head difference shown is the difference between the groundwater elevation at Upper Scotch Grove well MW-106A and Farmers Creek well MW-106C. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in East Region Monitoring Well Pair MW-106A/MW-106C

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-15



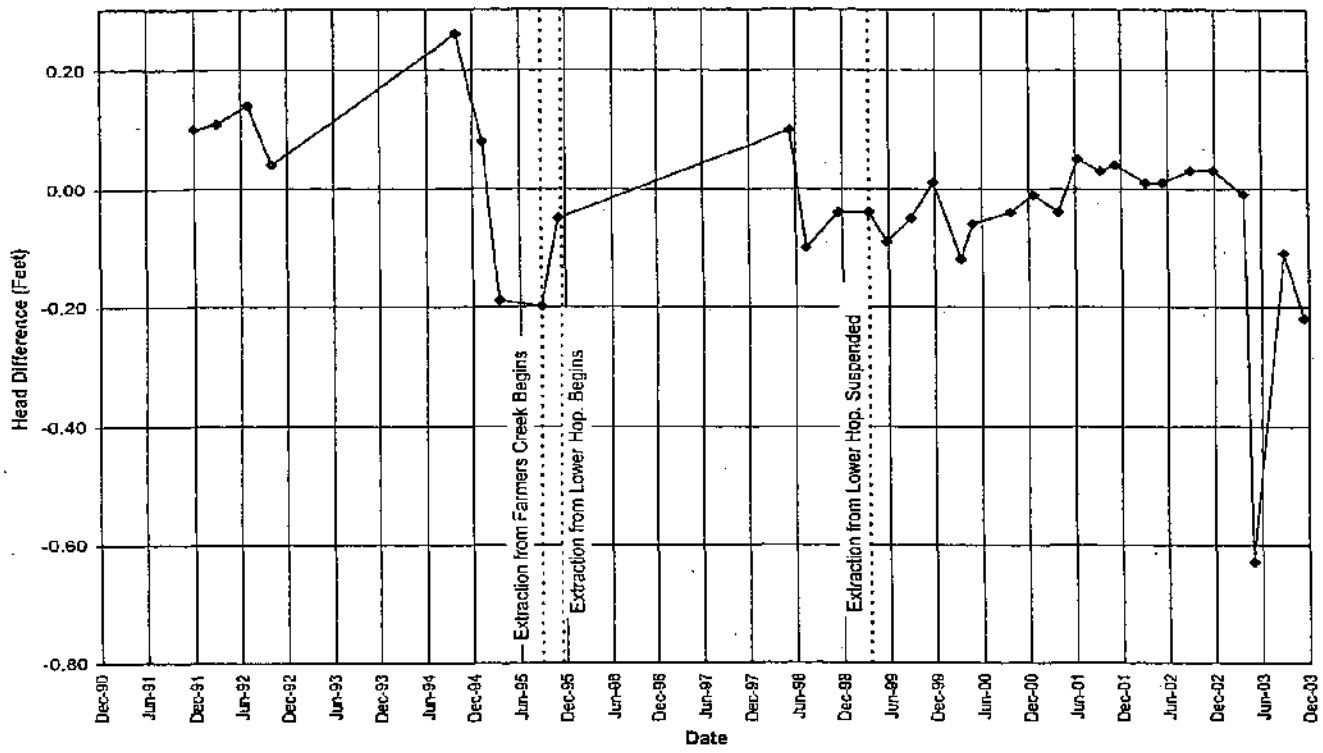
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-109B and Farmers Creek well MW-109C. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in East Region Monitoring Well Pair MW-109B/MW-109C

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-16



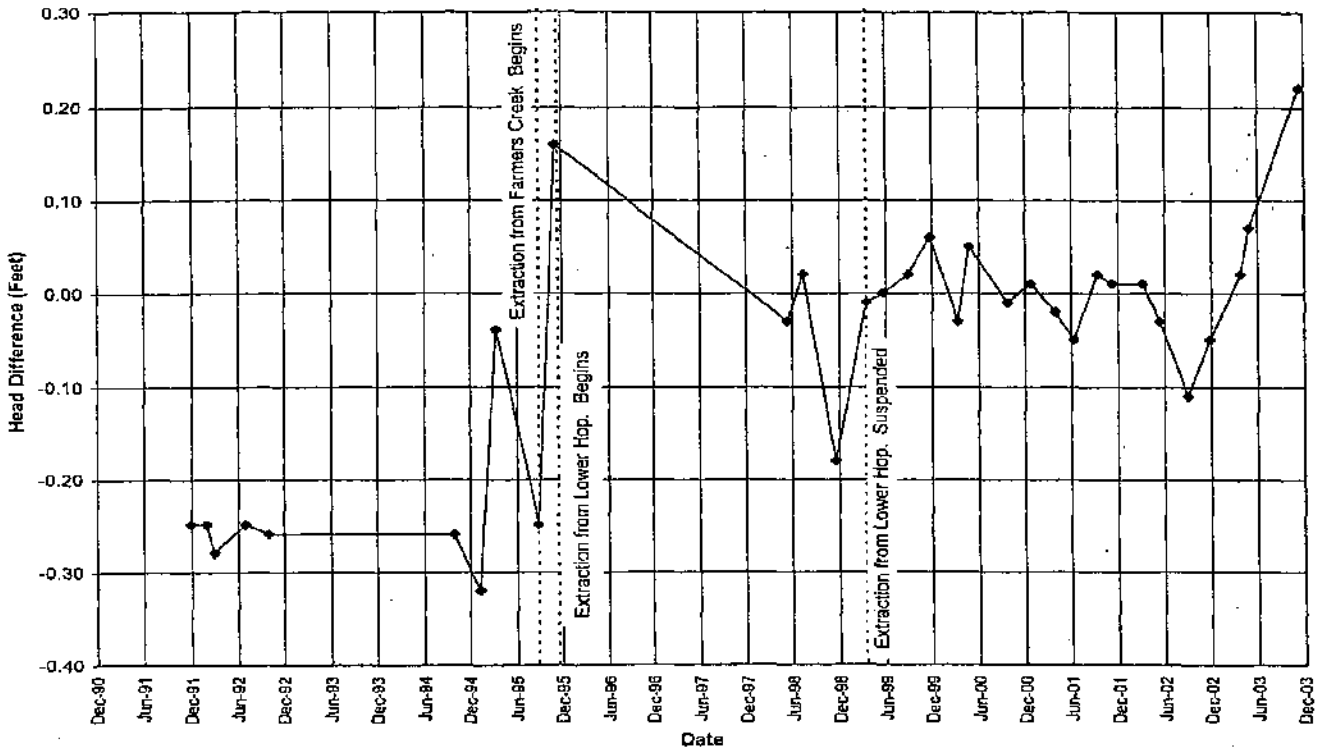
Notes:

1. Head difference shown is the difference between the groundwater elevation at Farmers Creek well MW-101C and Lower Hopkinton well MW-101D. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-101C/MW-101D

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-17



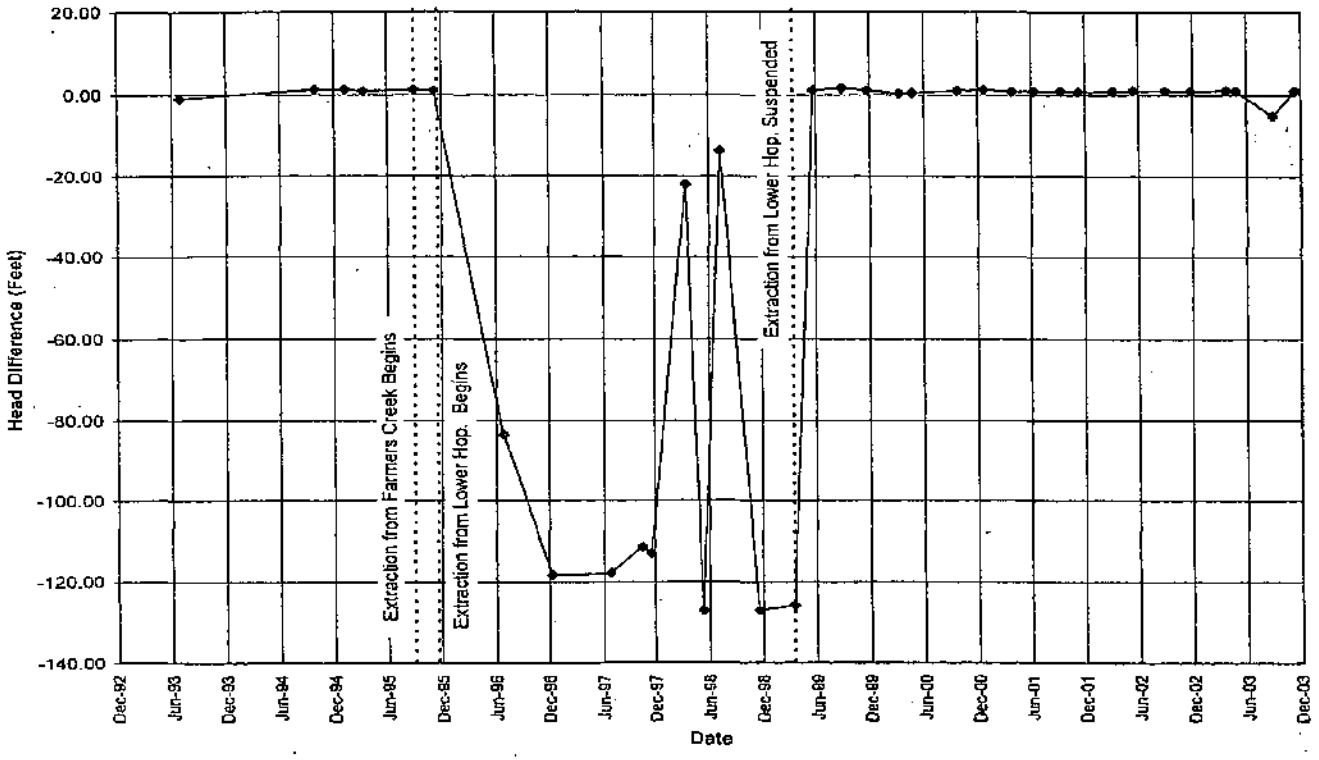
Notes:

1. Head difference shown is the difference between the groundwater elevation at Farmers Creek well MW-97C and Lower Hopkinton well MW-97D. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in West Region Monitoring Well Pair MW-97C/MW-97D

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-18



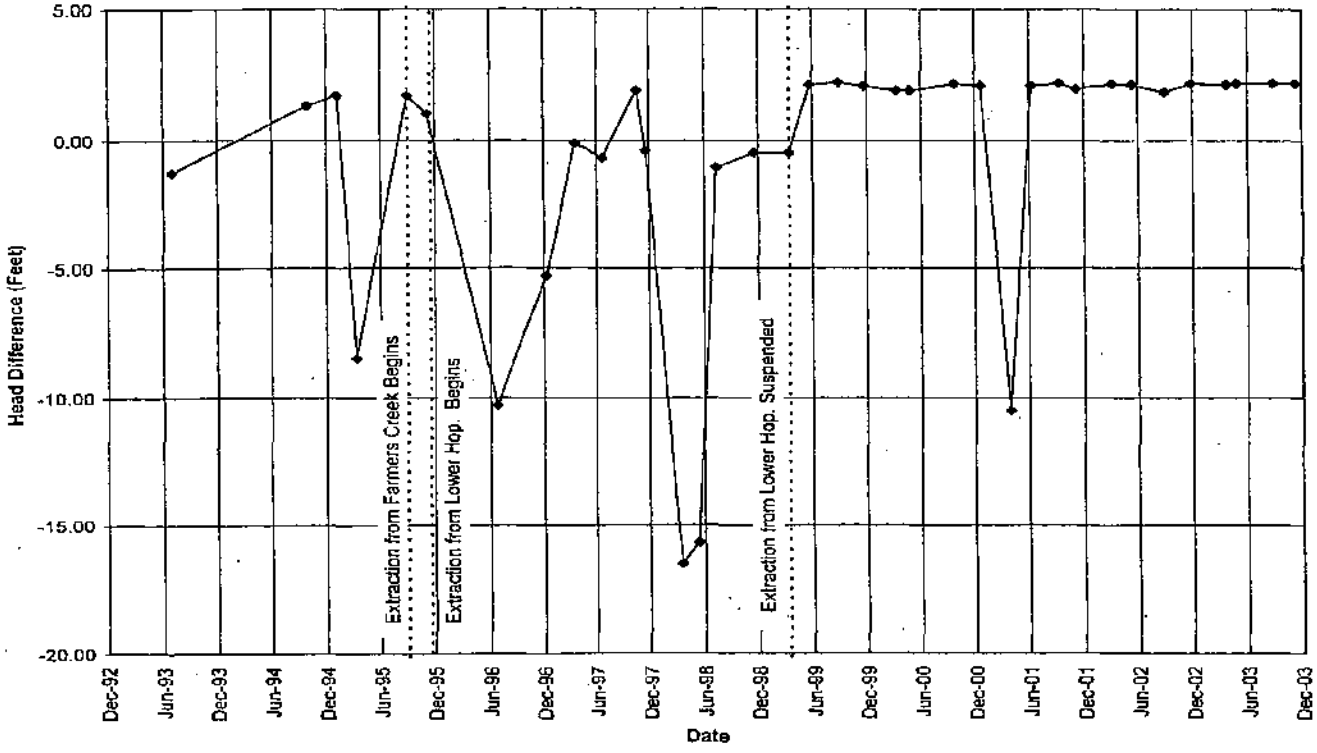
Notes:

1. Head difference shown is the difference between the groundwater elevation at Farmers Creek well MW-84C and the adjacent Lower Hopkinton well EW-14c. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in Adjacent East Region Wells
MW-84C/EW-14c

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-19



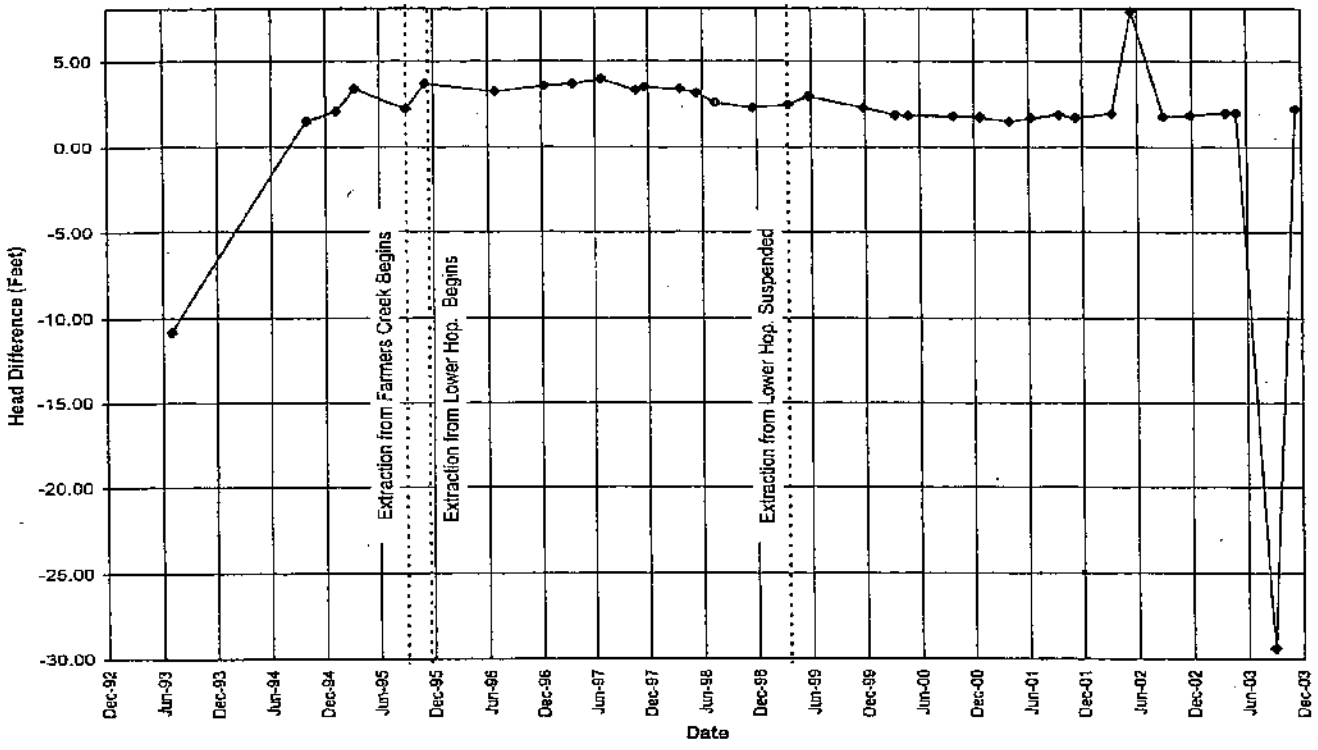
Notes:

1. Head difference shown is the difference between the groundwater elevation at Farmers Creek well MW-85C and the adjacent Lower Hopkinton well EW-15c. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Erler & Kalinowski, Inc.

Historic Head Difference in Adjacent East Region Wells MW-85C/EW-15c

Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-20



Notes:

1. Head difference shown is the difference between the groundwater elevation at Farmers Creek well MW-108C and the adjacent Lower Hopkinton well EW-16c. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

2. The pump at inactive extraction well EW-16c was exercised on 28 August 2003, temporarily causing an uncharacteristically large downward gradient. As a result, the head difference shown for August 28 on this figure does not represent the ambient head difference between wells MW-108 and EW-16c.

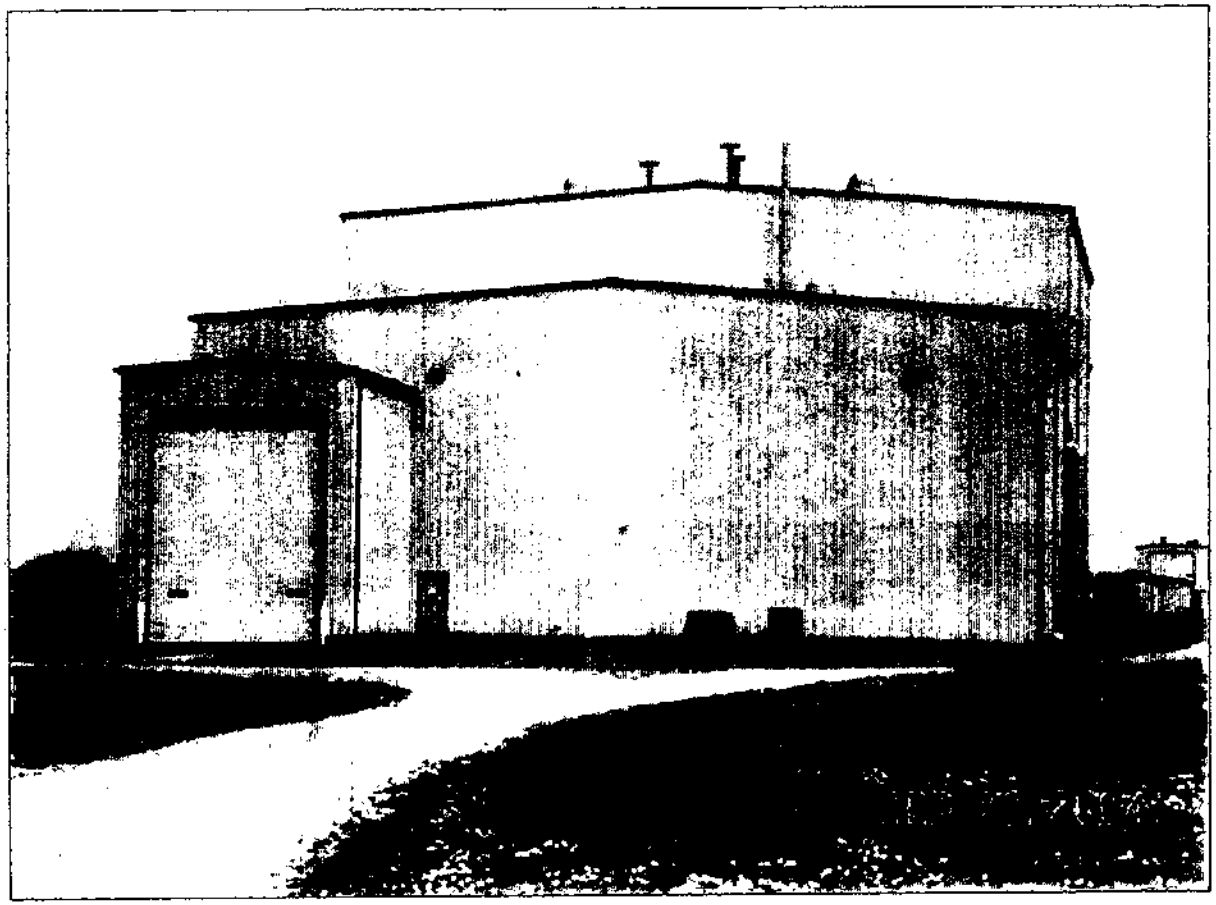
Erler & Kalinowski, Inc.

Historic Head Difference in Adjacent East Region Wells MW-108C/EW-16c

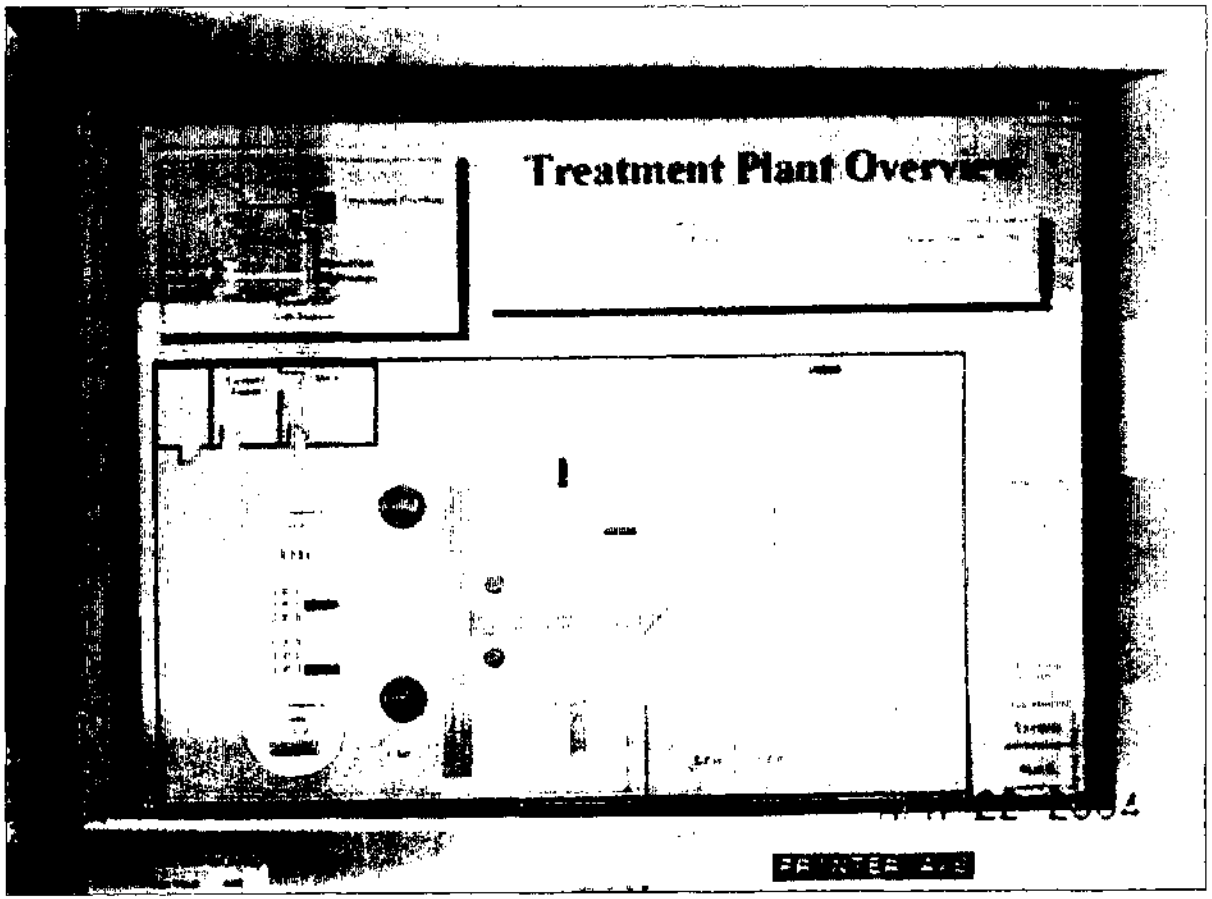
Chemplex Site
Clinton, Iowa
January 2004
EKI 890052.32
Figure G-21

Attachment E

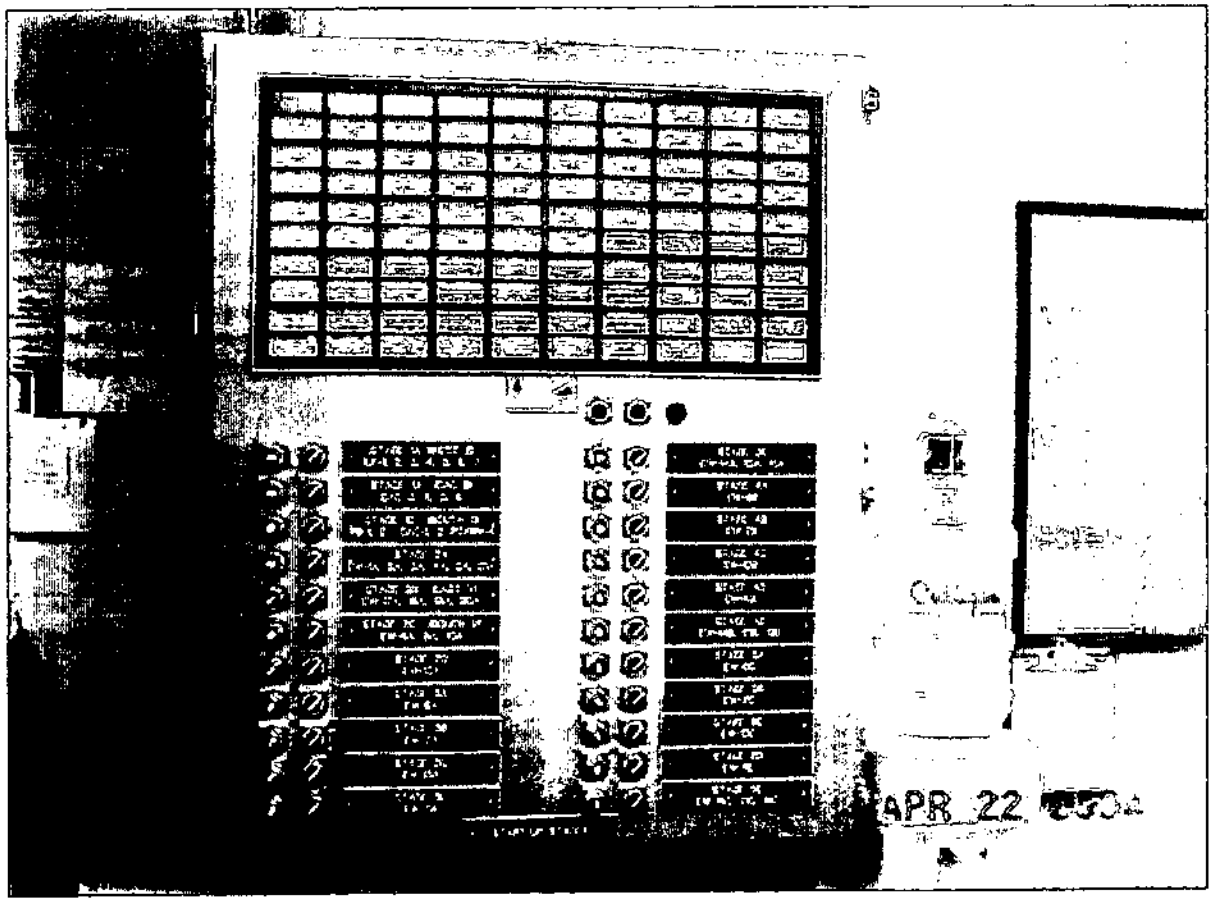
Sign at front gate on 21st Street



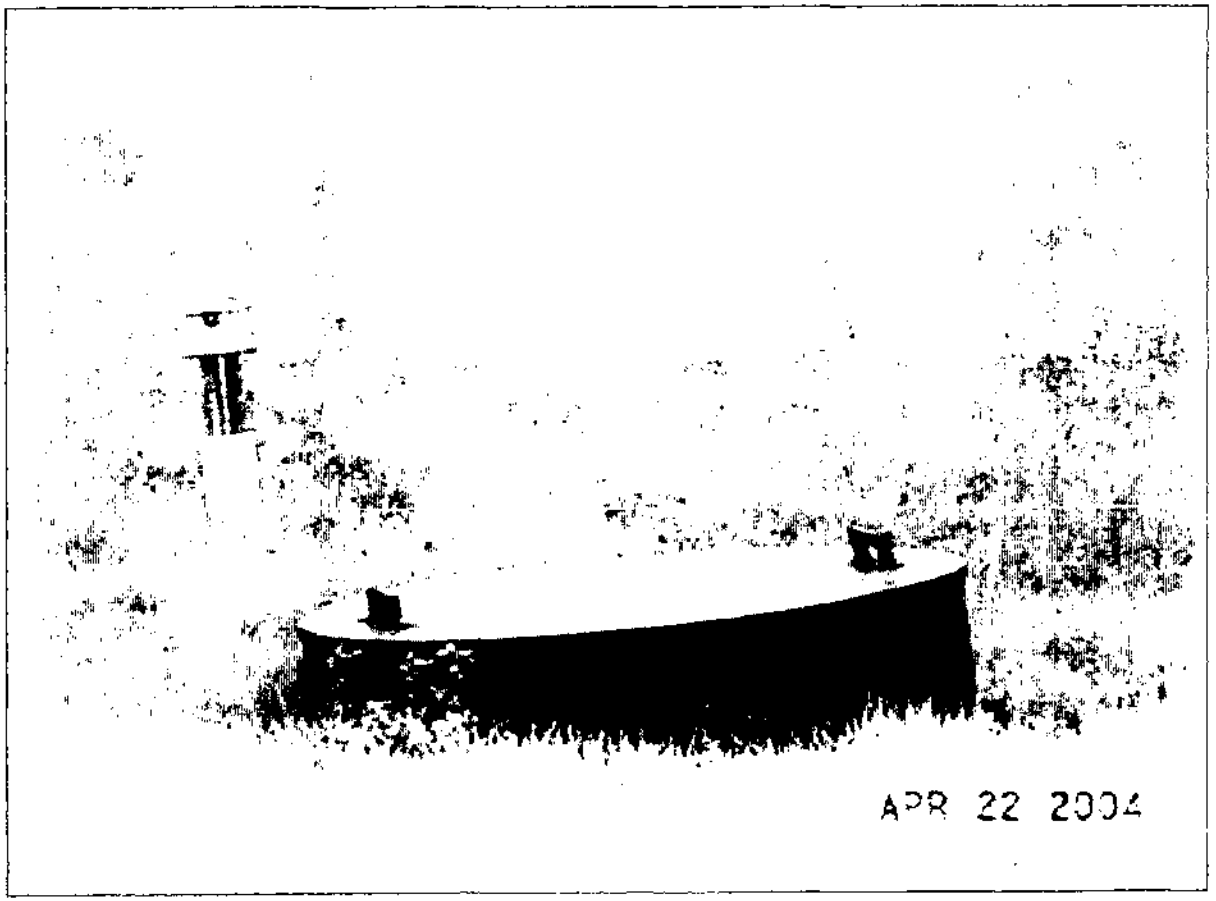
OU 1 Treatment Building



Operator Interface Computer

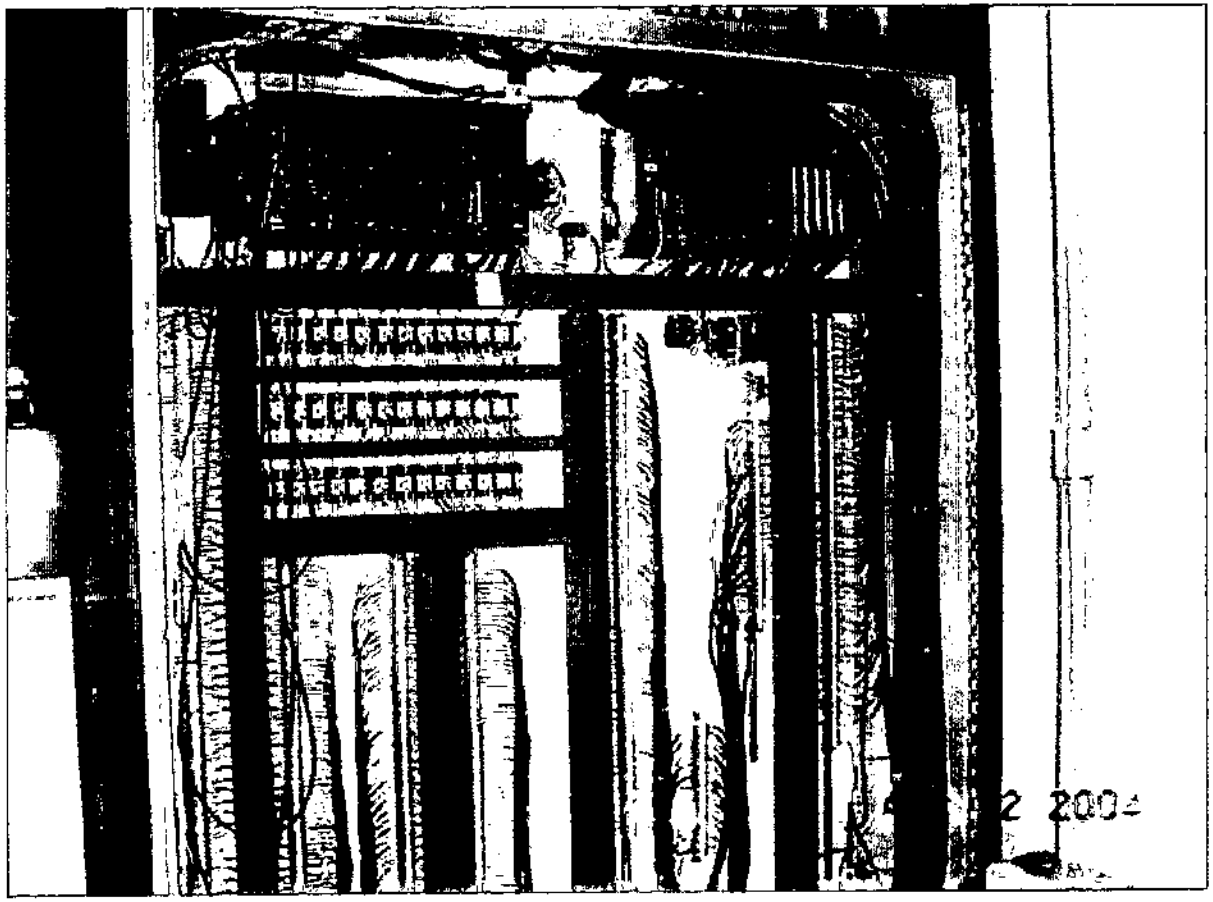


First-In Alarm Panel

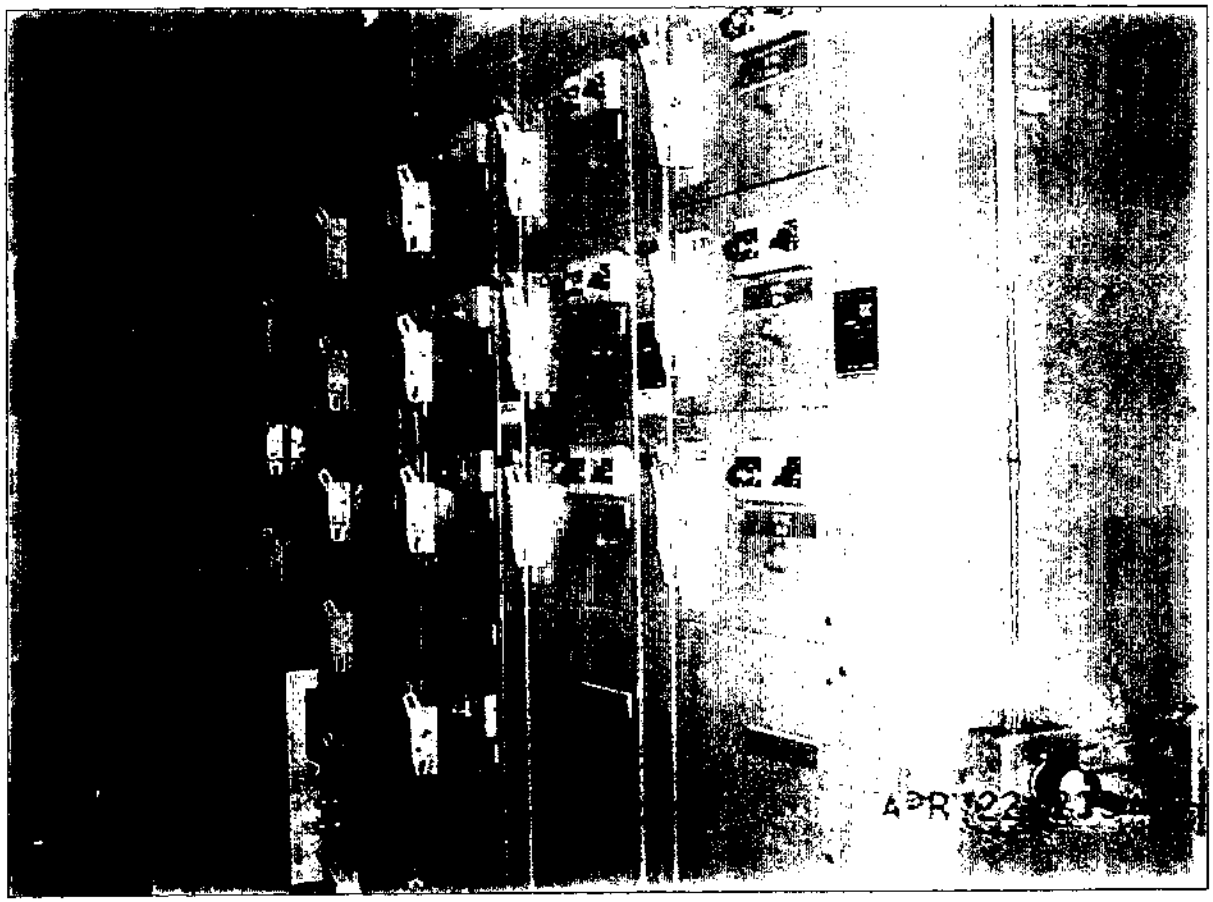


Landfill Area Vapor Extraction Vault

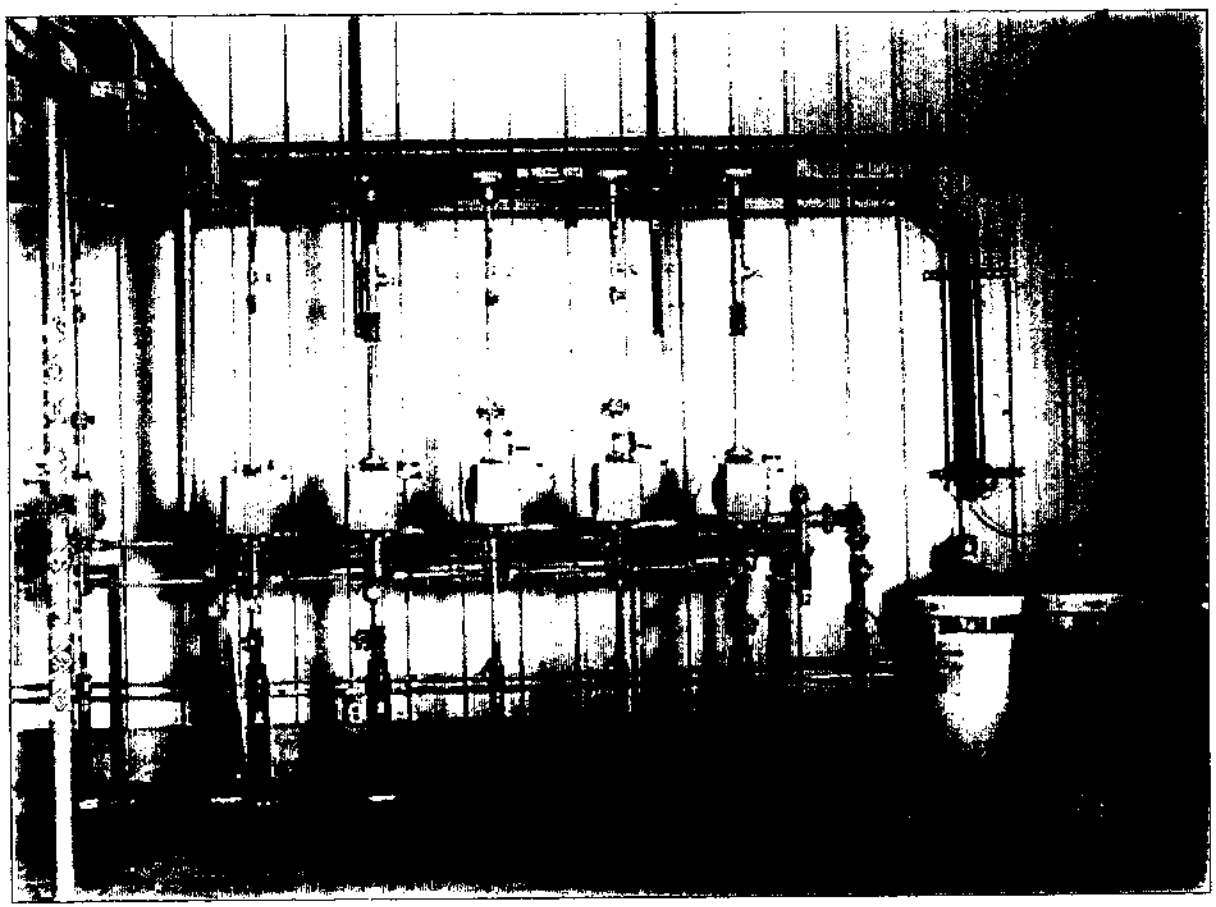
Landfill Area Cap and LGE System (Equistar facility in Background)



Programmable Logic Controller (PLC)

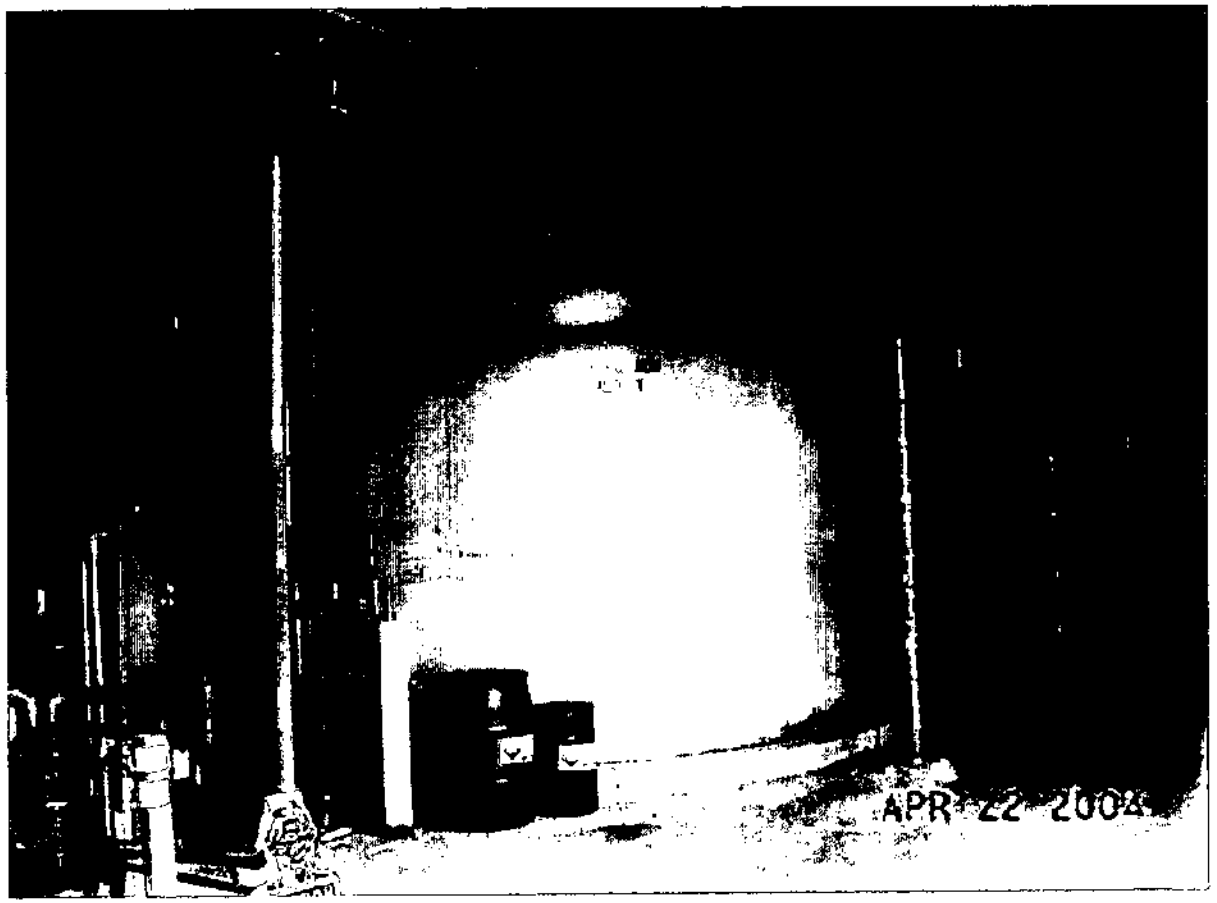


Motor Control Center (MCC) Room Controls

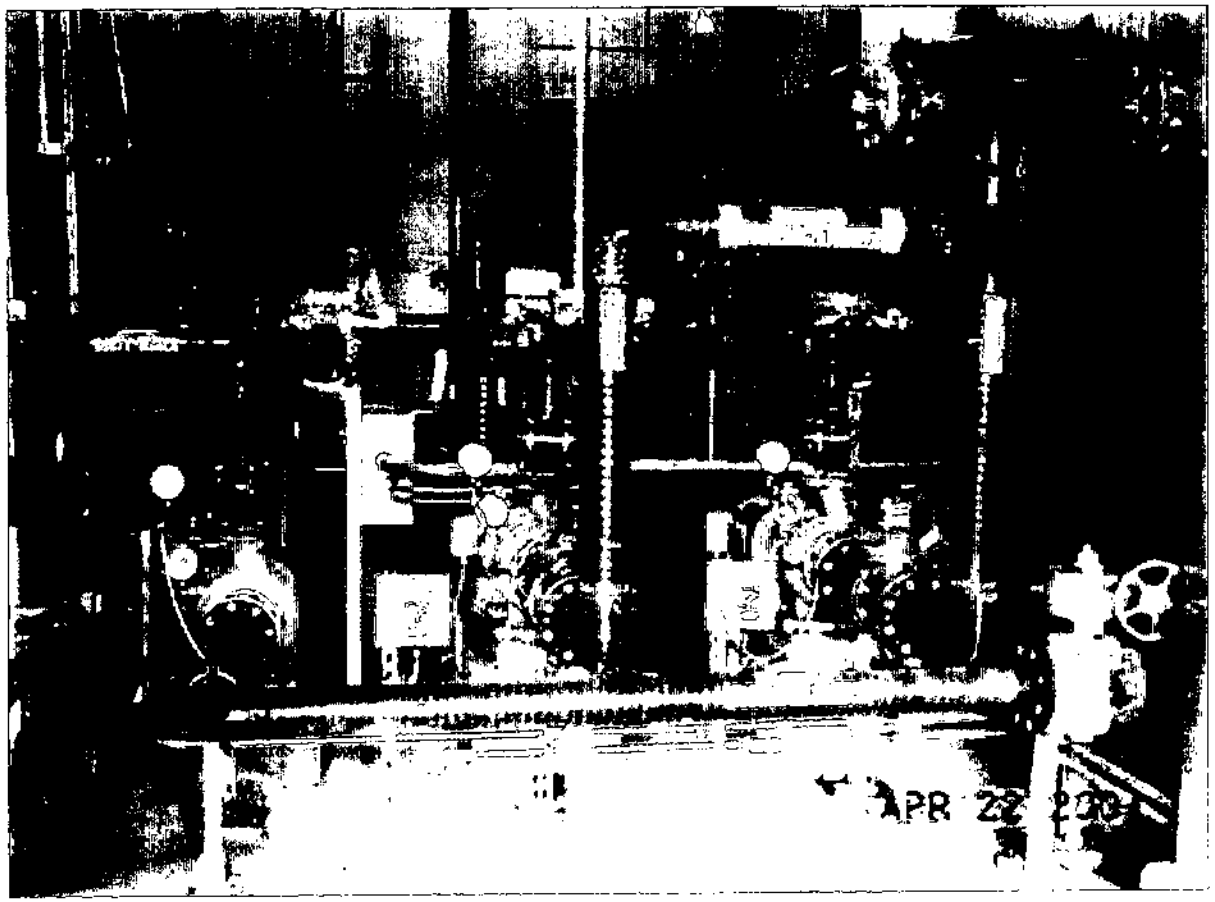


Influent Manifold & Chlorine Day Tanks

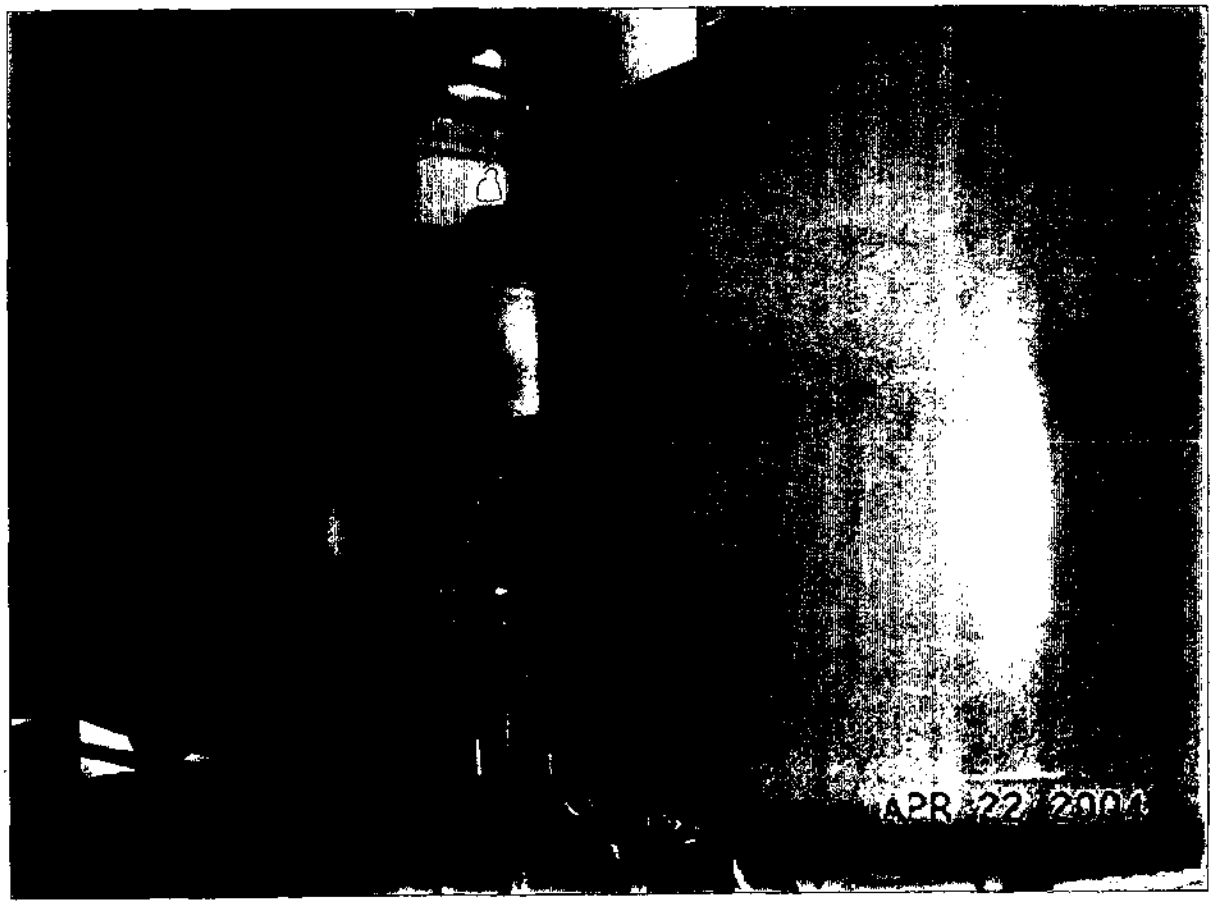
BNA Influent Tank



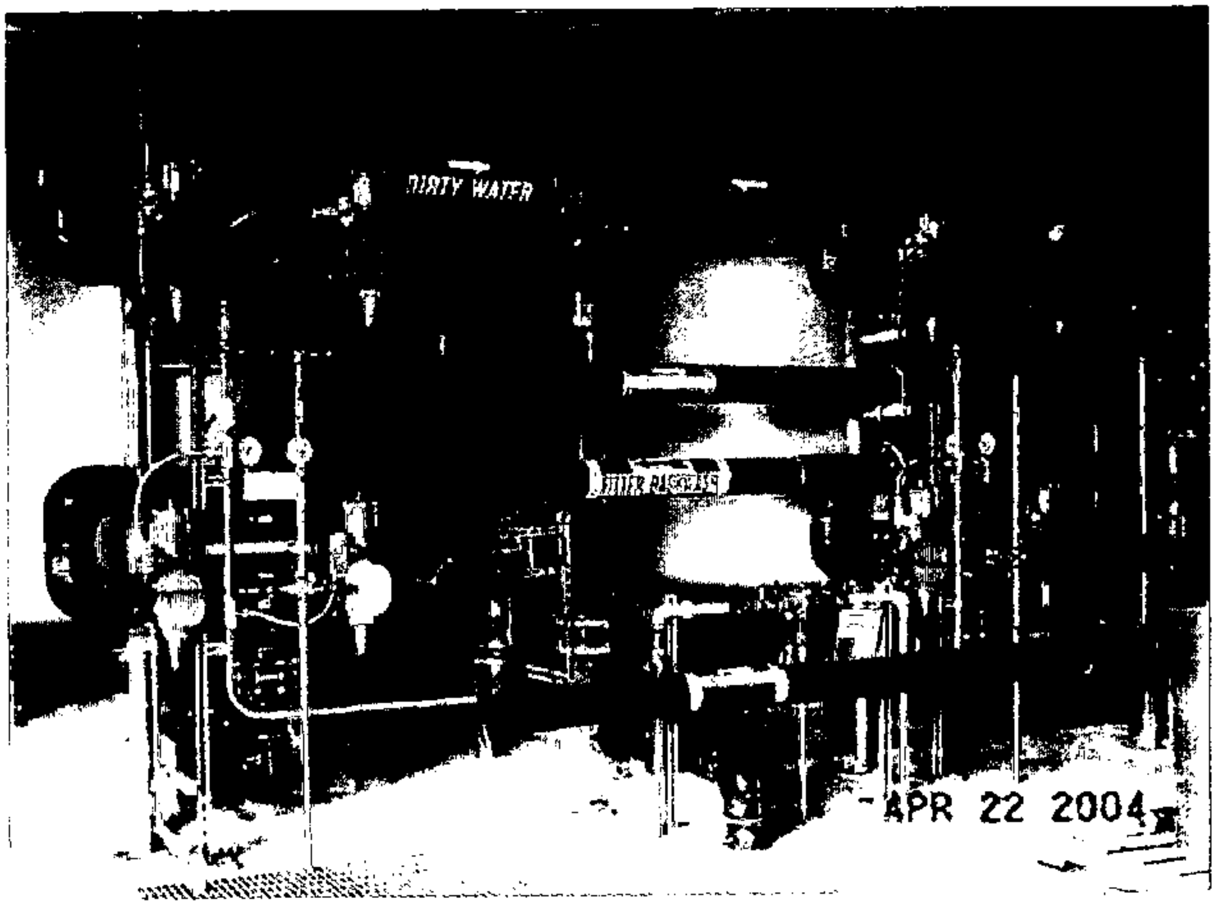
VOC Influent Tank



VOC Influent Tank Pumps

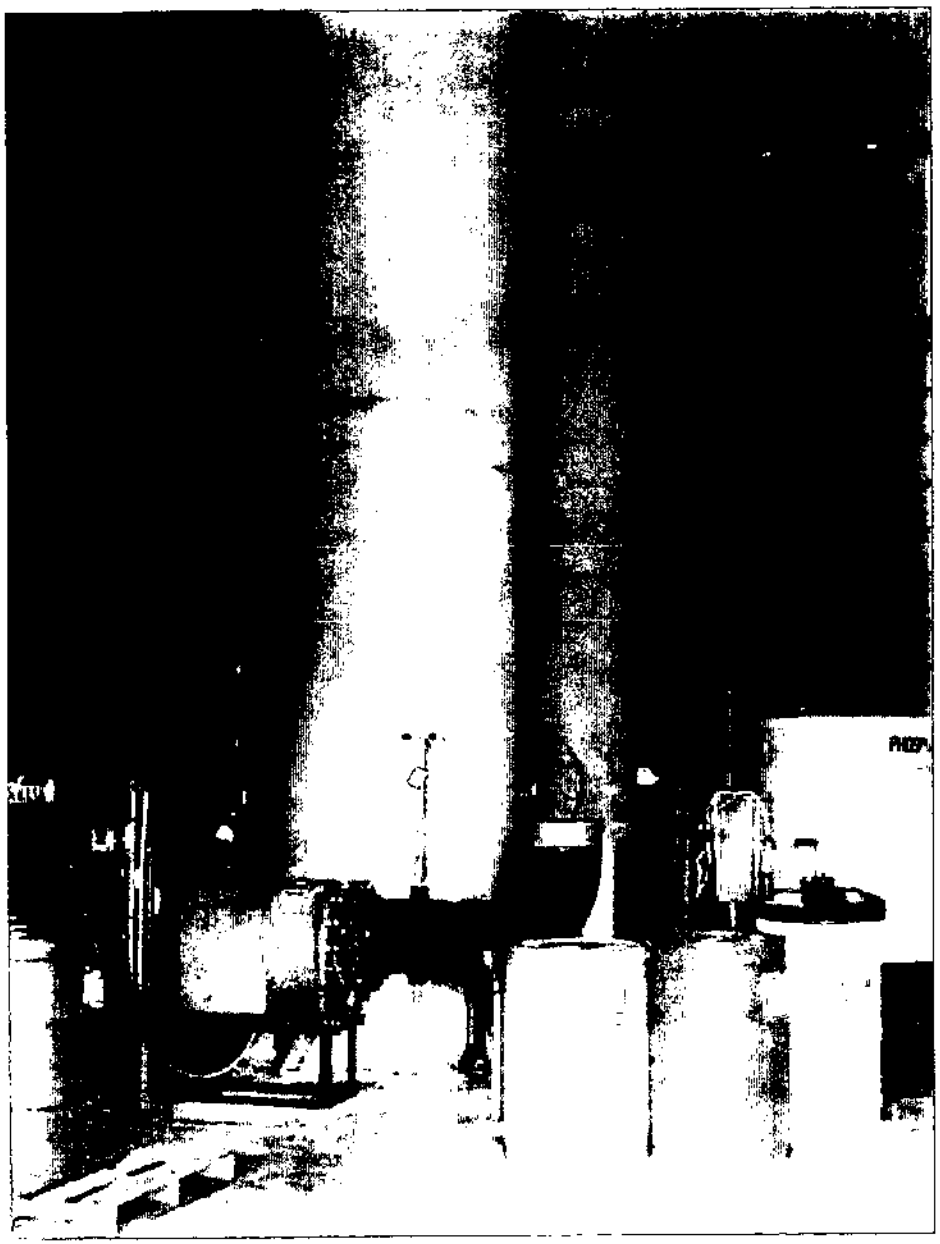


Pressure Filters

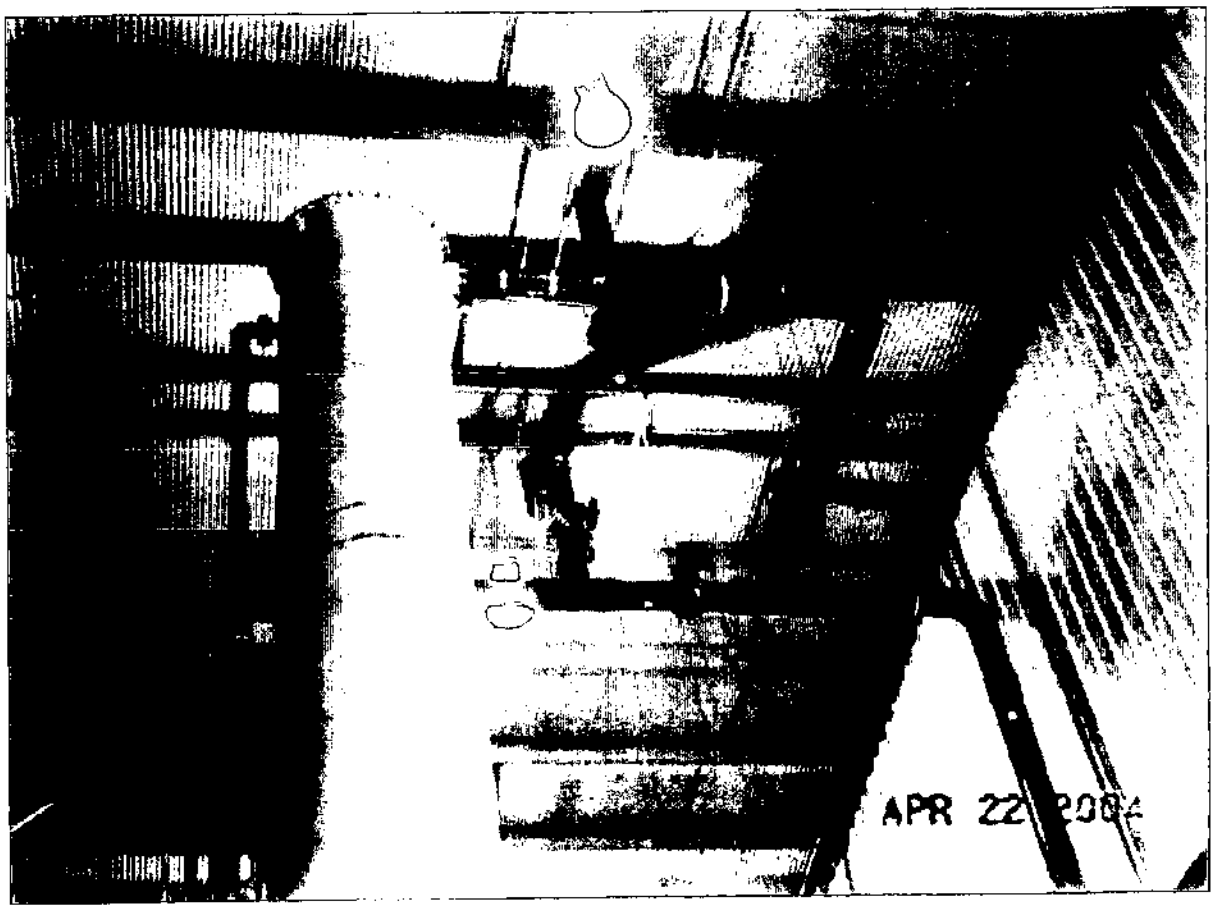


Pressure Filter Piping

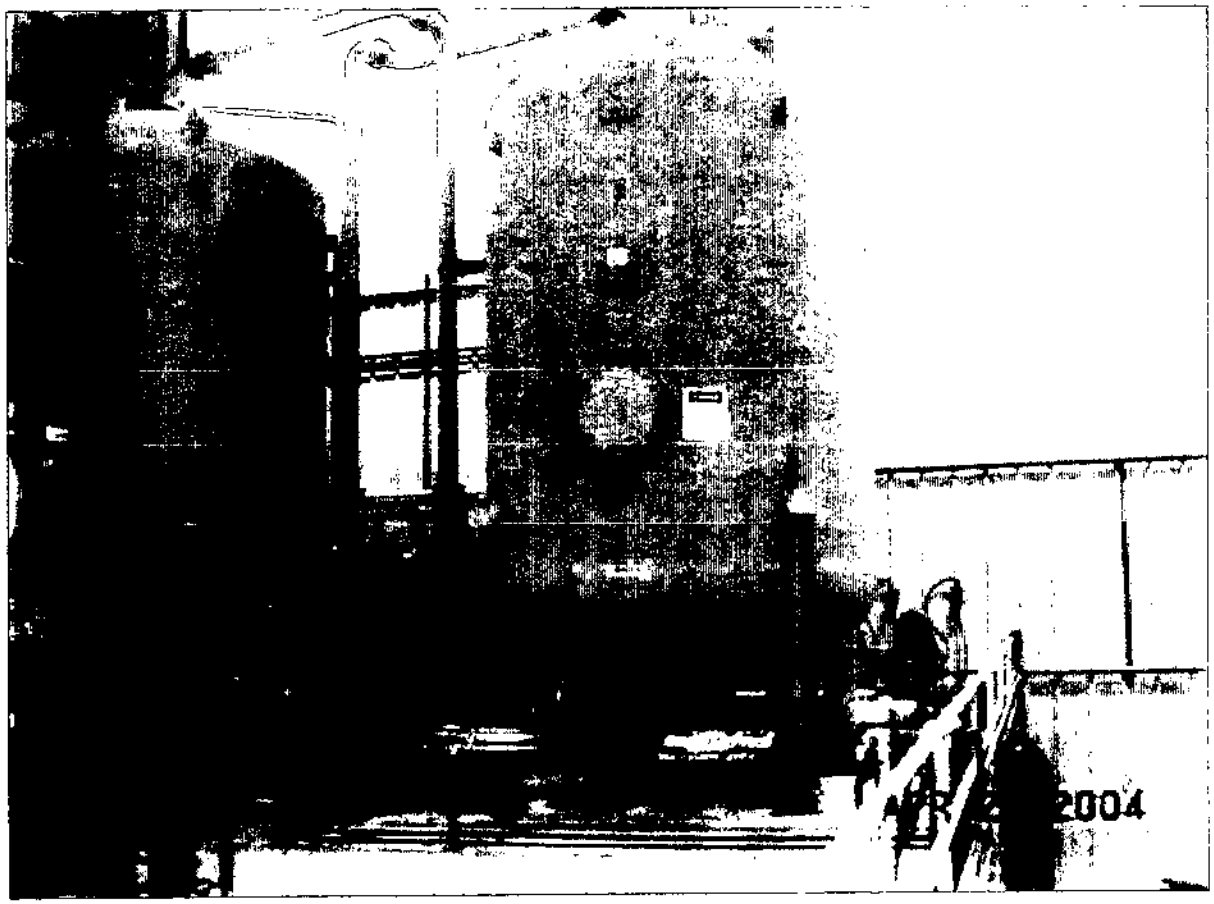
Phosphate Feed System



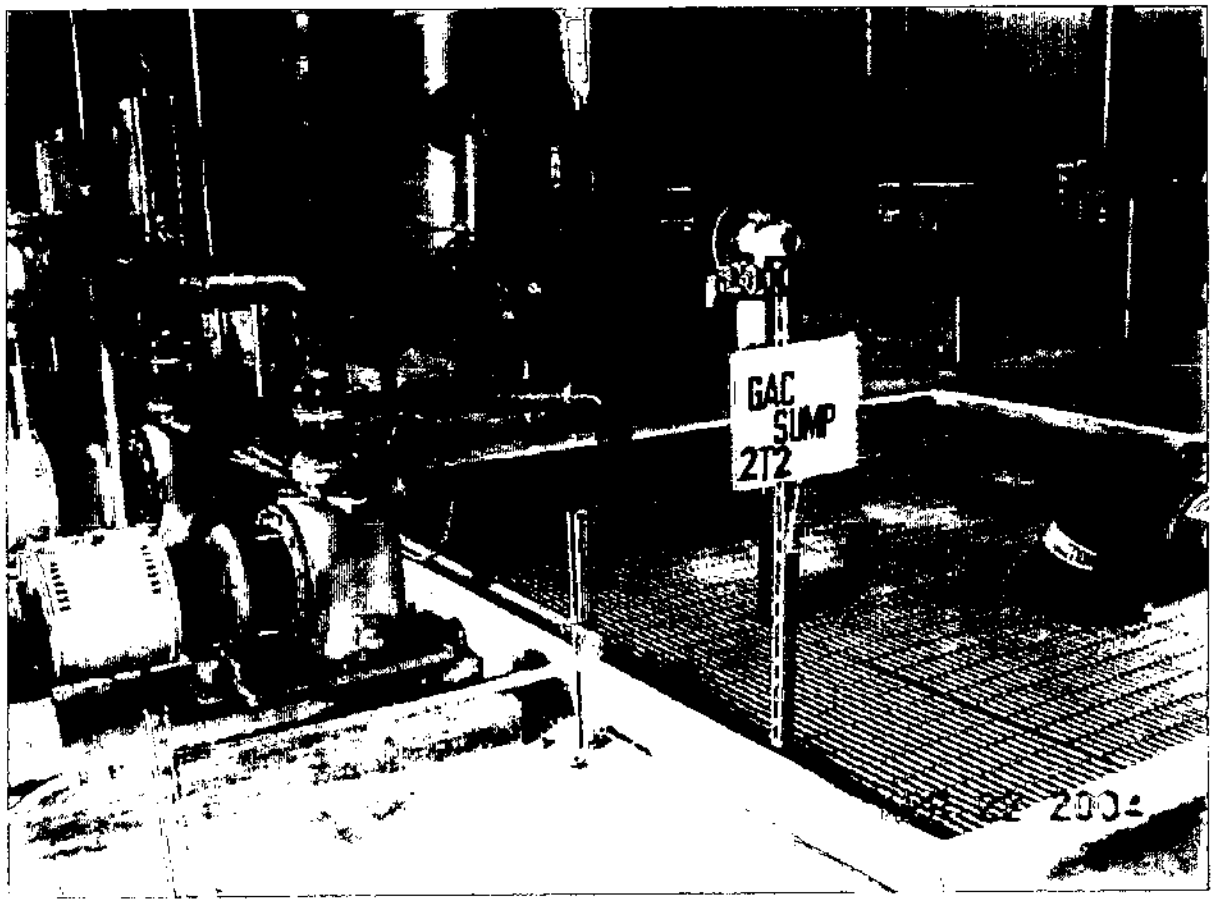
Ground view of
Air Stripper



View from the top of Air Stripper

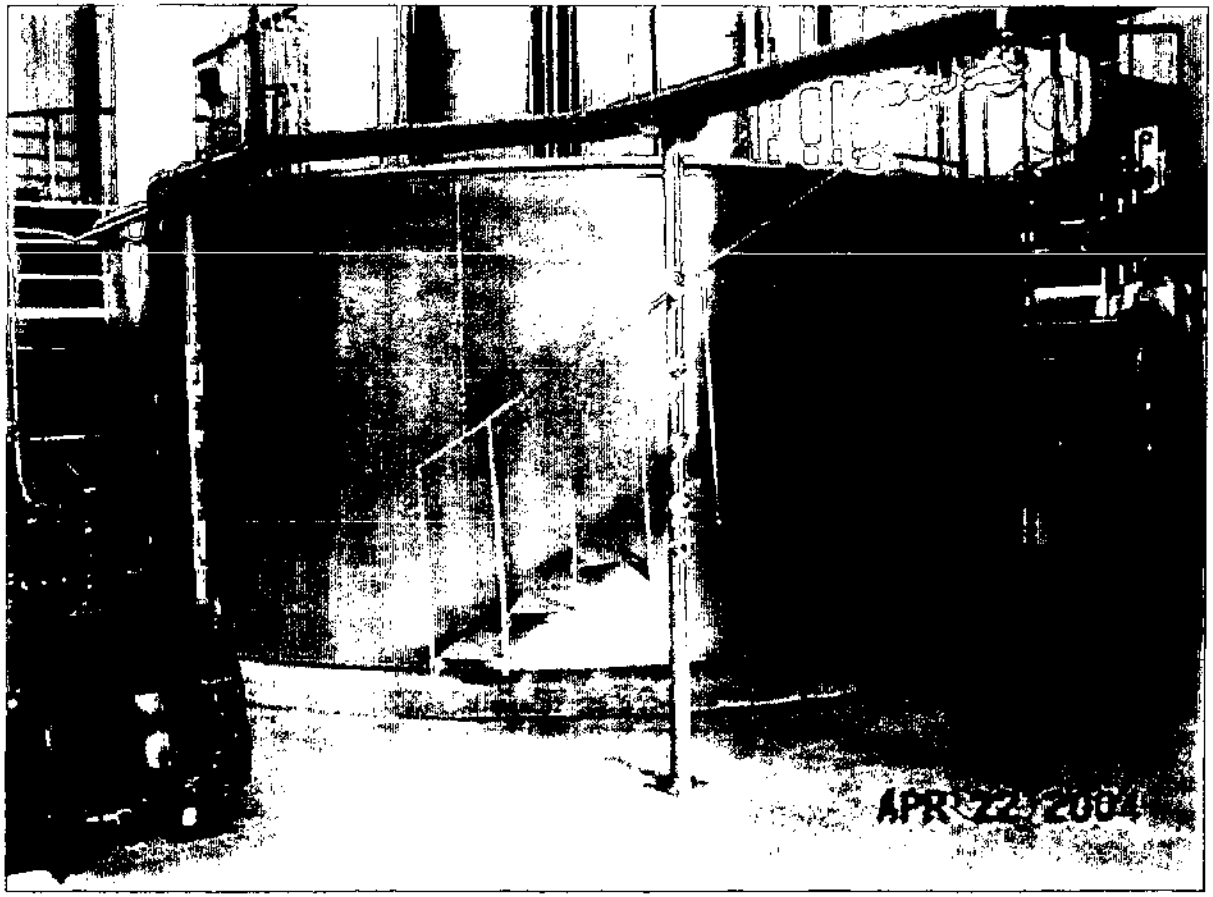


Granular Activated Carbon (GAC) Vessels



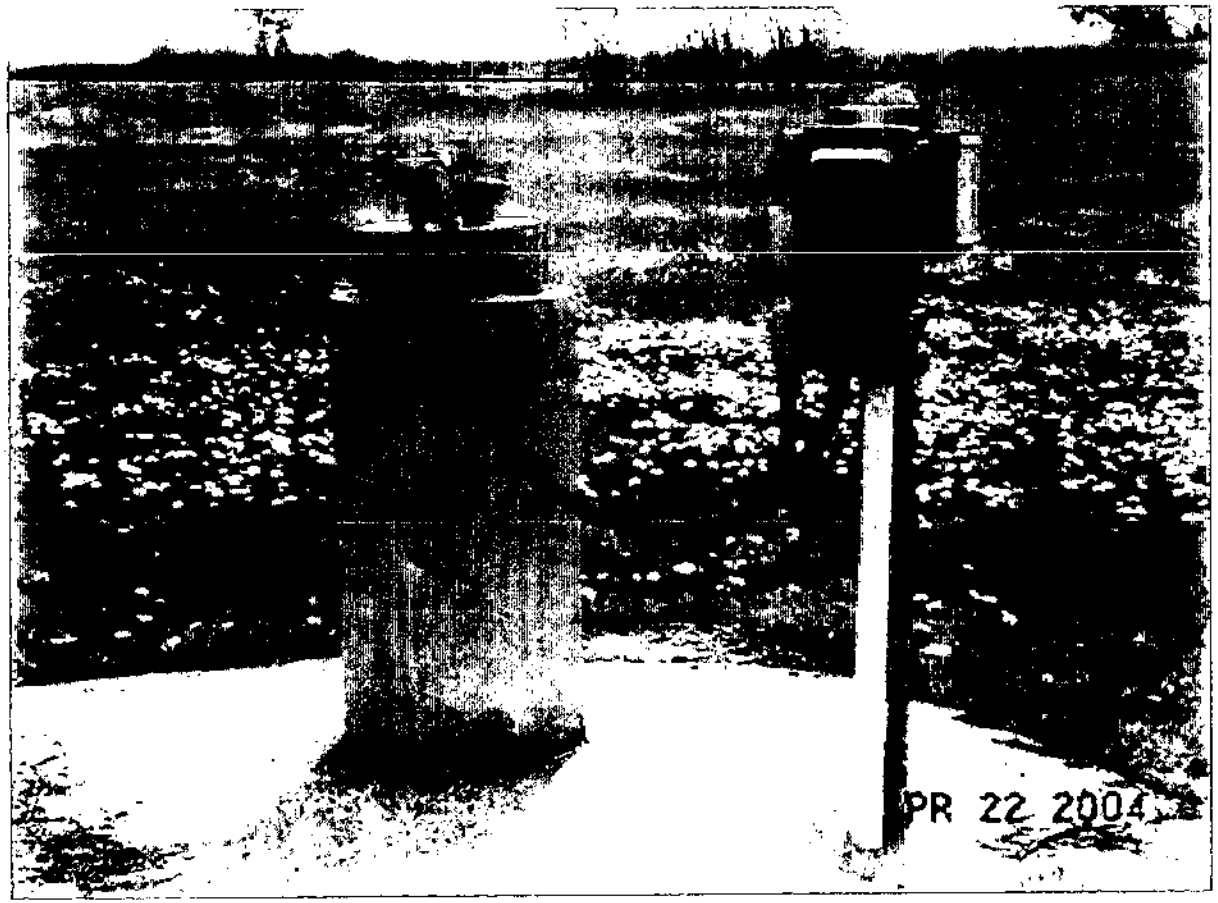
Granular Activated Carbon (GAC) Sump

Backwash Pumps

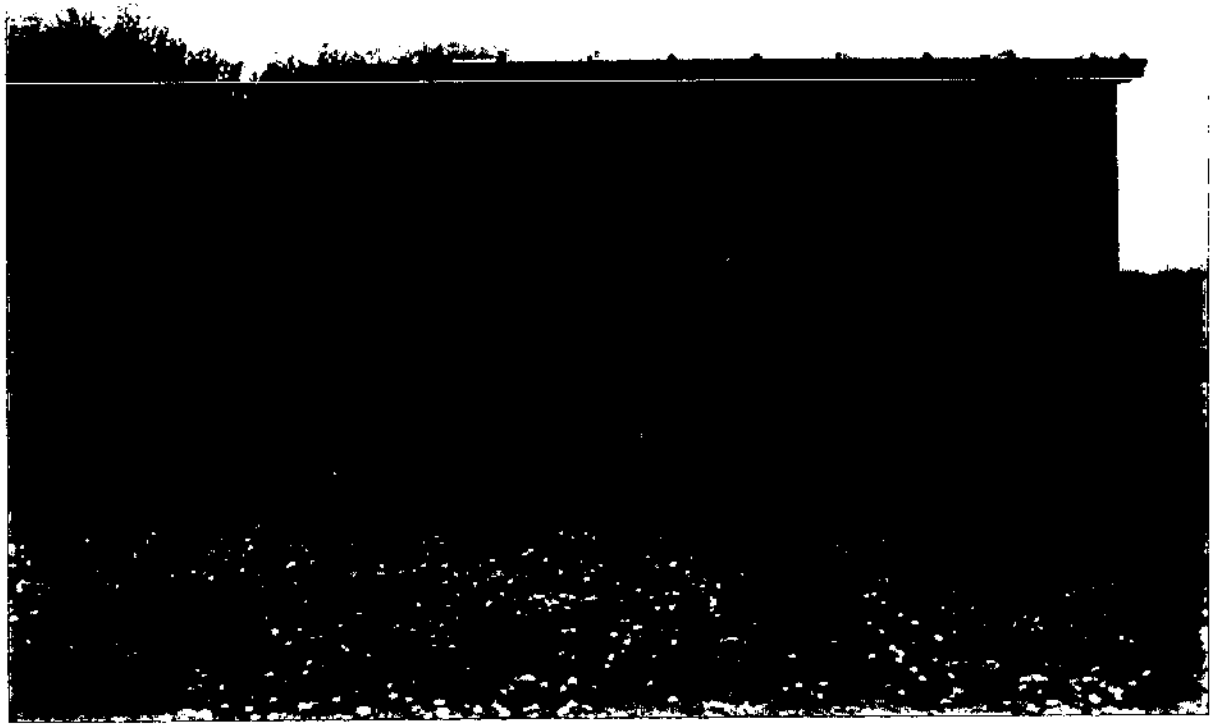


Dirty Water Tank 3T2

Extraction Well – below ground type

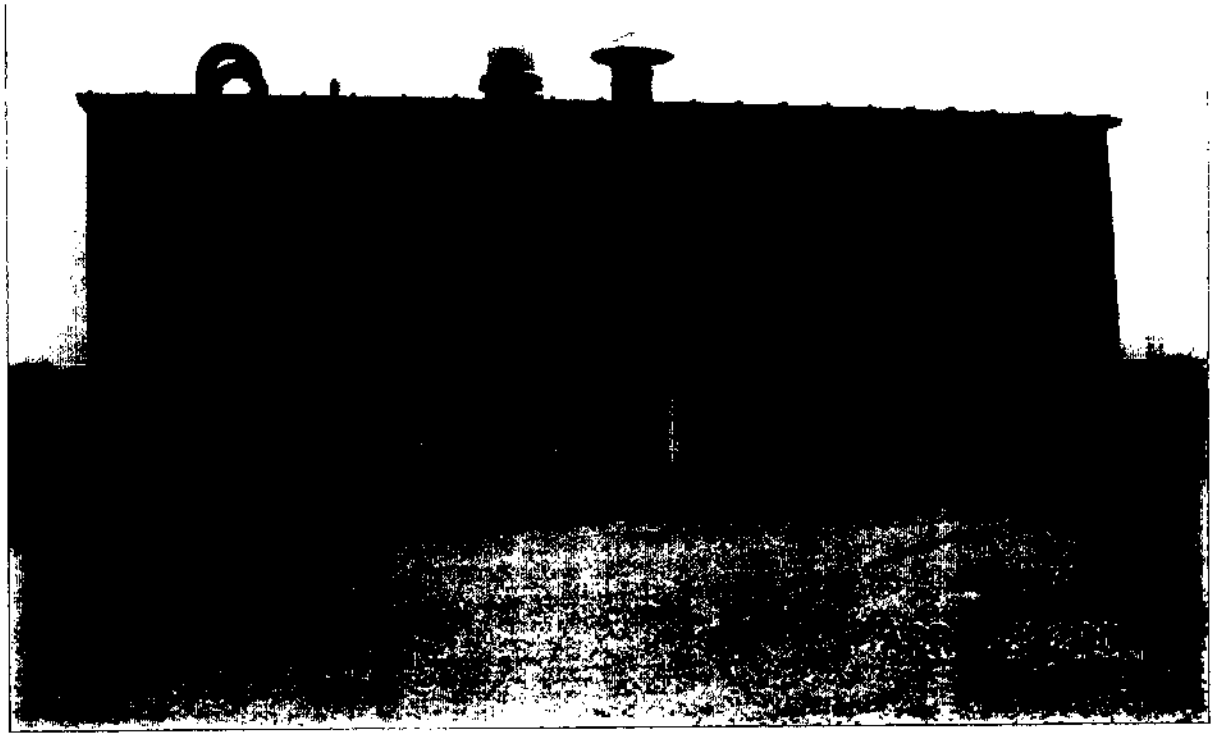


Extraction Well – above ground type



Lift Station – South V

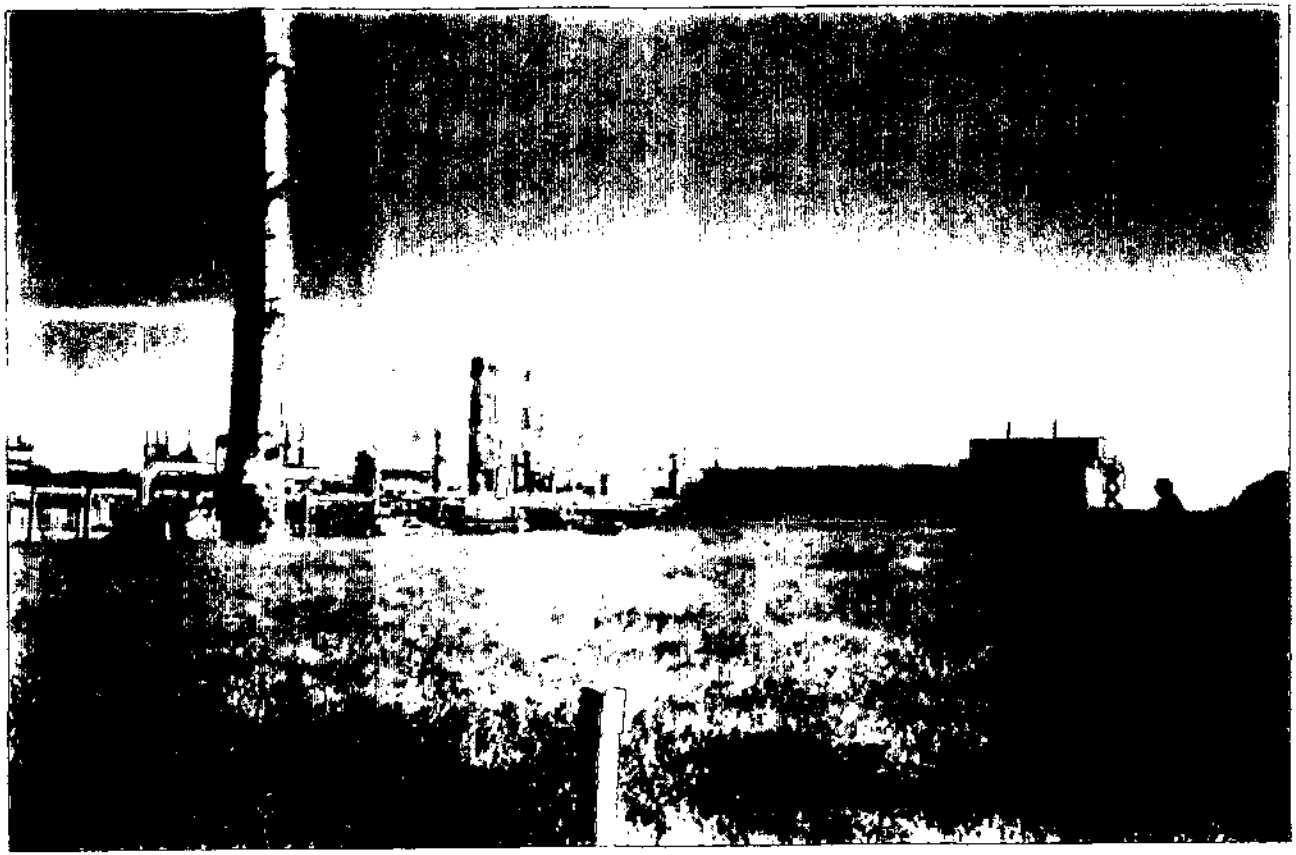
Lift Station – electrical control room



OU 2 Blower Building

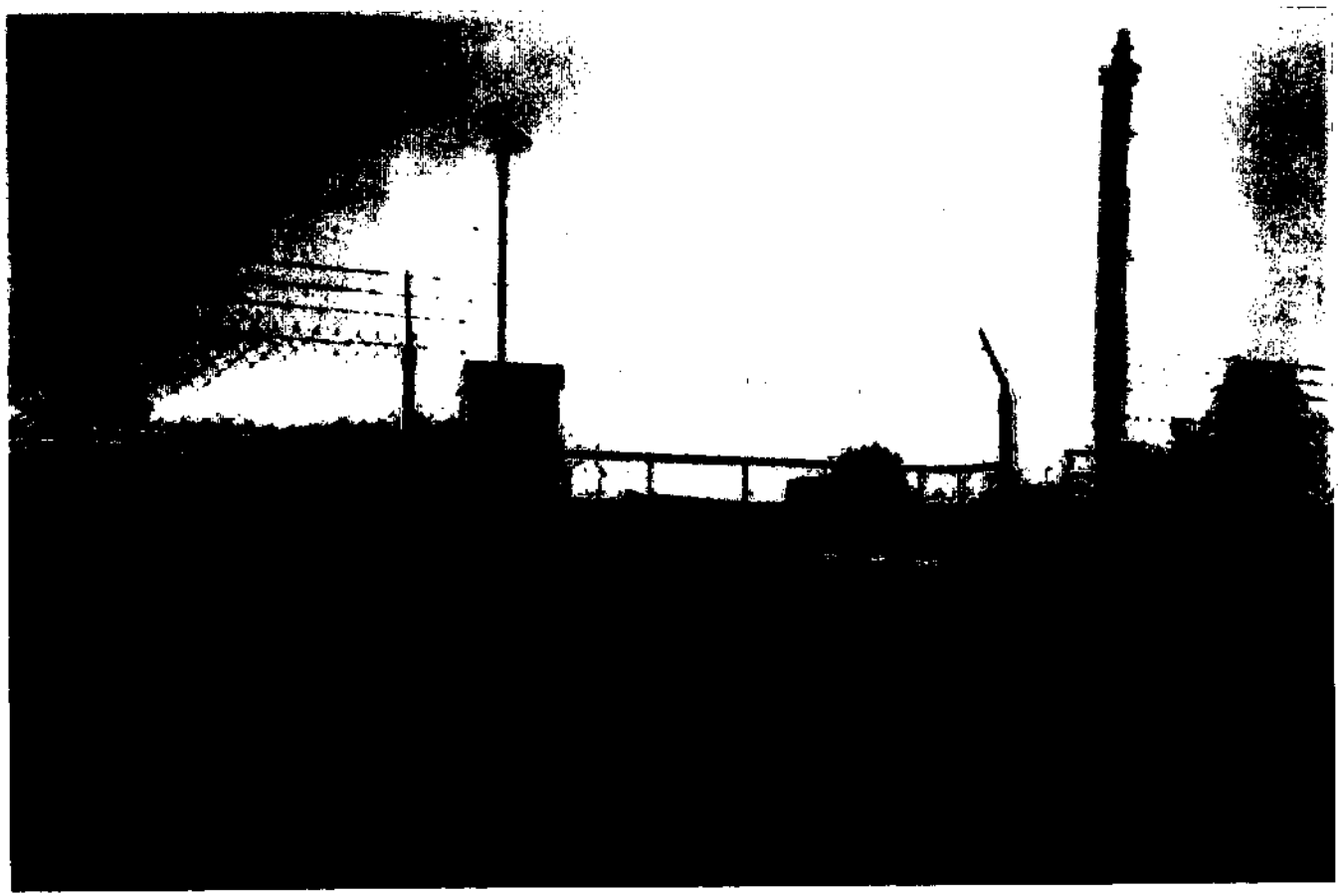
Catalytic Oxidizer (Cat ox)

Landfill Area Cap and LGE System



Landfill Area Cap and LGE System (Equistar facility in Background)

Rock Creek Wetland Area



Equistar Production Well No. 2

Attachment F

Cal Lundberg
<Cal.Lundberg@dnr.state.ia.us>

To: Nancy Swyers/SUPR/R7/USEPA/US@EPA
cc:
Subject: Fwd: Re: Questions concerning Chemplex

05/19/2004 12:29 PM

A response on Chemplex NPDES issue.

Cal Lundberg, Supervisor
Contaminated Sites Section
Iowa Department of Natural Resources
Wallace State Office Building
Des Moines, IA 50319
515/281-7040
cal.lundberg@dnr.state.ia.us

>>> Paul Brandt 05/19/04 12:27PM >>>
No, we are not concerned about it. This sample result occurred in the first quarter of 2002. There has not been another detect of phenol, or anything else since then. At the time, ACC/Getty personnel reported this may have been a fluke because phenol is usually never above detect in their wastewater. We inspected the facility in 3-02 and noted no problems. If the exceedences had continued, we would consider it a problem, but that has not happened.

>>> Cal Lundberg 05/19/04 09:39AM >>>
With reference to item #1. Does FO 6 have a concern about phenol violations for ACC/GCC (Chemplex) NPDES permits. EPA is doing a 5-year review under CERCLA.

I'm not looking for any particular response - just the field office take on the thing.

Thanks

Cal Lundberg, Supervisor
Contaminated Sites Section
Iowa Department of Natural Resources
Wallace State Office Building
Des Moines, IA 50319
515/281-7040
cal.lundberg@dnr.state.ia.us

>>> Steve Williams 05/13/04 01:57PM >>>
Cal,

1. Does the DNR have concerns about the violations for phenols? I suppose it depends on who the "DNR" is! Personally, I think almost any permit violation should be a concern. I write a permit that has certain requirements. There is a documented reason for why each requirement is in the permit. I have an expectation at the time I write the permit that the requirements I specify will be met. However, it is the field offices that are responsible for compliance and enforcement and they likely will not view everything the same way I do. Perhaps you should ask this question of Field Office #6 (Paul Brandt, Jim Sievers or Terry Jones).

2. The NPDES permit was issued to ACC Chemical and GCC Chemical not specifically to Chemplex. The current permit was issued in 1999 and expires June 3, 2004. Application for reissuance was received December 6, 2003. Given

our current staffing, current backlog of expired permits and current priorities I do not expect this permit to be reissued any time soon. I don't even have an estimate for you of when it might be reissued.

The Code of Iowa provides that an expired permit remains in effect provided a timely and complete renewal application is filed and unti the agency takes final action on that application. ACC/GCC filed a timely renewal application and will therefore be able to continue to operate under their permit even after it expires.

>>> Cal Lundberg 05/13/04 01:13PM >>>
Does the DNR have concerns about the violations for phenol for Chemplex? Last one evidently 2002.

Evidently they applied for a permit in 2003 (late?). What is the status of that permit?

Questions from Nancy Swyers EPA.

Thanks

Cal Lundberg, Supervisor
Contaminated Sites Section
Iowa Department of Natural Resources
Wallace State Office Building
Des Moines, IA 50319
515/281-7040
cal.lundberg@dnr.state.ia.us

Attachment G

TABLE 1

Combined VOC and BNA Stream Air Stripping Tower Emissions

Screening-Level Health Risk Analysis for Upper-Bound Carcinogenic Risk - 2000 Data

Chemplex Site - First Operable Unit, Clinton, Iowa

BNA Stream

Compound	Concentration (ug/L) (a) (b)				Emissions (g/s) (c)				
	1Q00	2Q00	3Q00	4Q00	1Q00	2Q00	3Q00	4Q00	Average
Flowrate (gpm)	165	162	91	137	-				
Vinyl Chloride	5 U	71 J	43	39 J	0.0E+00	7.3E-04	2.5E-04	3.4E-04	3.3E-04
Methylene Chloride	5 U	240	5 U	120 U	0.0E+00	2.5E-03	0.0E+00	0.0E+00	6.1E-04
Trichloroethene	370	290	180	350	3.9E-03	3.0E-03	1.0E-03	3.0E-03	2.7E-03
Benzene	700	520	340	530	7.3E-03	5.3E-03	2.0E-03	4.6E-03	4.8E-03
Tetrachloroethene	3,300	2,300	1,000	2,300	3.4E-02	2.4E-02	5.7E-03	2.0E-02	2.1E-02
Chloroform	5 U	120 U	1 J	120 U	0.0E+00	0.0E+00	5.7E-06	0.0E+00	1.4E-06

VOC Stream

Compound	Concentration (ug/L) (a) (b)				Emissions (g/s) (c)				
	1Q00	2Q00	3Q00	4Q00	1Q00	2Q00	3Q00	4Q00	Average
Flowrate (gpm)	144	143	113	114	-				
Vinyl Chloride	5 U	12 U	5 U	4 J	0.0E+00	0.0E+00	0.0E+00	2.9E-05	7.2E-06
Methylene Chloride	5 U	7	5 U	12 U	0.0E+00	6.3E-05	0.0E+00	0.0E+00	1.6E-05
Trichloroethene	44	33	30	21	4.0E-04	3.0E-04	2.1E-04	1.5E-04	2.7E-04
Benzene	5 U	12 U	5 U	12 U	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Tetrachloroethene	510	340	1,110	220	4.6E-03	3.1E-03	7.9E-03	1.6E-03	4.3E-03
Chloroform	5 U	12 U	5 U	12 U	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Total Emissions

Compound	Concentration (ug/L) (a) (b)				Emissions (g/s) (c)				
	1Q00	2Q00	3Q00	4Q00	1Q00	2Q00	3Q00	4Q00	Average
Vinyl Chloride	-	-	-	-	0.0E+00	7.3E-04	2.5E-04	3.7E-04	**3.3E-04**
Methylene Chloride	-	-	-	-	0.0E+00	2.5E-03	0.0E+00	0.0E+00	**6.3E-04**
Trichloroethene	-	-	-	-	4.3E-03	3.3E-03	1.2E-03	3.2E-03	**3.0E-03**
Benzene	-	-	-	-	7.3E-03	5.3E-03	2.0E-03	4.6E-03	**4.8E-03**
Tetrachloroethene	-	-	-	-	3.9E-02	2.7E-02	1.4E-02	2.1E-02	**2.5E-02**
Chloroform	-	-	-	-	0.0E+00	0.0E+00	5.7E-06	0.0E+00	**1.4E-06**

TABLE 1

Combined VOC and BNA Stream Air Stripping Tower Emissions

Screening-Level Health Risk Analysis for Upper-Bound Carcinogenic Risk - 2000 Data

Chemplex Site - First Operable Unit, Clinton, Iowa

Notes:

(a) The above data is taken from analytical laboratory results from the quarterly treatment system sampling rounds during the Year 2000. Concentrations have generally declined since 2000, so current emissions are less than those shown.

(b) Concentrations shown in **boldface type** indicate detections above laboratory practical quantitation limit and represent valid detections. "J" qualifier following value indicates that the analyte was detected at the concentration shown, but that the value was less than the laboratory method detection limit, but greater than the laboratory practical quantitation limit.

(c) For calculation purposes, "non-detect" values were assumed to be zero.

TABLE 2

Combined VOC and BNA Stream Air Stripping Tower Emissions: Screening-Level Health Risk Analysis for Upper-Bound Carcinogenic Risk (2000 Data) (7)

Chemplex Site - First Operable Unit, Clinton, Iowa

Compound	Assumed Emission Rate (1) (g/s)	Annual Average Ground Concentration for 1 g/s Emission Rate (2) ((mg/m3)/(g/s))	Inhalation Risk 1/(ug/m3)	Slope Factor (3) ((kg)(day)/mg)	Carcinogenic Risk (4)
Vinyl Chloride	3.3E-04	0.020	8.80E-06	3.08E-02	2.4E-8
Methylene Chloride	6.3E-04	0.020	4.70E-07	1.65E-03	2.4E-9
Trichloroethene (current)	3.0E-03	0.020	-	6.00E-03	4.2E-8
Trichloroethene (draft) (5)	3.0E-03	0.020	-	2.00E-02	1.4E-7
Benzene (6)	4.8E-03	0.020	7.80E-06	2.73E-02	3.1E-7
Tetrachloroethene	2.5E-02	0.020	-	1.00E-02	5.9E-7
Chloroform	1.4E-06	0.020	2.30E-05	8.05E-02	2.7E-10
				TOTAL (with current TCE slope factor)	9.7E-7
				TOTAL (with draft TCE slope factor)	1.1E-6

Notes:

(1) From Table 1.

(2) Annual average concentration at five feet above ground level at the Munck residence (2300 feet from the stack) based on a 1 g/s hypothetical total emission rate for each compound from the air stripper stack (calculated as 10% of one-hour maximum obtained using SCREEN2 model; see Appendix B).

(3) The slope factors for vinyl chloride, methlyene chloride, benzene, and chloroform are from the U.S. Environmental Protection Agency's ("EPA's") Integrated Risk Information System ("IRIS") (EPA, 2003). The slope factor for tetrachloroethene and trichloroethene were obtained from EPA-NCEA as reported in (EPA, 2000). The trichloroethene value has since been withdrawn and replaced with "draft" values as shown. communication with EPA's Environmental Criteria Assessment Office ("ECAO"). All slope factors assume a 70-year exposure, 365 days/year.

(4) Estimated upper-bound lifetime incremental cancer risk for a 30-year exposure, 350 days/year by a 70-kg person inhaling 20 cubic meters of air daily, per table titled "Summary of Standard Default Exposure Factors", from OSWER Risk Assessment Guidance for Superfund, Vol. I Supplemental Guidance "Standard Default Exposure Factors" dated 25 March 1991. The estimated upper-bound lifetime incremental cancer risk is calculated as follows:

Risk = [(ER) x (AC) x (BR) x (EF) x (ED) x (SF)] / [(AF) x (AD) x (BW)]

where:

ER = Emission rate (g/s)
AC = Annual average ground concentration at an emission rate of 1 g/s ((mg/m^3)/(g/s))
BR = Breathing rate = 20 m^3/day
EF = Number of days of exposure per year = 350 day/yr
ED = Number of years of exposure = 30 yr
SF = Slope factor ((kg)(day)/mg)
AF = Number of days per year = 365 day/yr
AD = Number of years in a lifetime = 70 yr
BW = Body weight = 70 kg

TABLE 2

Combined VOC and BNA Stream Air Stripping Tower Emissions: Screening-Level Health Risk Analysis for Upper-Bound Carcinogenic Risk (2000 Data) (7)

Chemplex Site - First Operable Unit, Clinton, Iowa

(5) EPA has proposed a range of slope factors for trichloroethene in a draft report (EPA, 2001). The lower end of that range 0.02 $(mg/kg*d)^{-1}$, is a value derived from an inhalation study and is used above as the slope factor for inhalation. The upper end of the range, 0.4 $(mg/kg*d)^{-1}$, is derived from an ingestion study and is not used in this risk assessment.

(6) A range of values was reported for benzene in the IRIS database. The upper bound of the range is used for calculation purposes.

(7) Because current emissions rates are significantly lower than the 2000 emissions rates, current carcinogenic risks are significantly lower than those shown.

"Splichal, Laura"
<SplichalLL@cdm.com
>

05/19/2004 11:25 AM

To: "Nancy Swyers (E-mail)" <swyers.nancy@epamail.epa.gov>
cc:
Subject: FW: Chemplex----Five-Year Review: Air Stripper Risk Tables

Nancy,

Below are my communications with Mike Profit, a CDM risk assessor from our Atlanta office. I asked him to check EKI's calculations of risk using the 2000 Chemplex data. He reviewed the information and found their evaluation procedures and calculations to be acceptable.

Please let me know if you need any further information on this.

Laura

-----Original Message-----
From: Profit, Michael
Sent: Wednesday, May 19, 2004 11:17 AM
To: Splichal, Laura
Subject: RE: Chemplex----Five-Year Review: Air Stripper Risk Tables

I checked them out and they are ok. One issue is the slope factor for TCE which EPA has not provided specific guidance on. I talked with a risk assessor in this region and he thought their logic was sound.

Mike

-----Original Message-----
From: Splichal, Laura
Sent: Monday, May 17, 2004 11:02 AM
To: Profit, Michael
Subject: FW: Chemplex----Five-Year Review: Air Stripper Risk Tables

Mike,

Would you have time to take a look at these risk calculations from the PRP at my Chemplex site sometime this week? We just need to do a general review to make sure their numbers and evaluation procedures are OK.

Charge number is 3282-982-RPZ-FPCXZ.

Do you have time to do this?

Thanks!

Laura

-----Original Message-----
From: Swyers.Nancy@epamail.epa.gov [mailto:Swyers.Nancy@epamail.epa.gov]
Sent: Friday, May 14, 2004 1:46 PM
To: tmnelson@semovm.semo.edu; Splichal, Laura
Subject: Chemplex----Five-Year Review: Air Stripper Risk Tables

I asked the PRPs to recalculate the risks from the air emissions, given that the total tons for 2000 was 1.42 tons which was greater than the 1.22 tons that was emitted in 1999 and discussed in the last Five-Year Review. Since 2000, the total tons emitted has dropped off significantly, so I figured if 2000 was OK, we didn't need to look at the risk for 2001, 2002, and 2003. Please review this information and let me know what you think. Please let me know how long it will take you to review this.

----- Forwarded by Nancy Swyers/SUPR/R7/USEPA/US on 05/14/2004 01:40 PM -----

belick tom

<tbelick@EKICONSULT.COM>

05/14/2004 12:44 PM

To: Nancy Swyers/SUPR/R7/USEPA/US@EPA

cc: umezaki dave <dumezaki@EKICONSULT.COM>, belick tom <tbelick@EKICONSULT.COM>

Subject: Chemplex----Five-Year Review: Air Stripper Risk Tables

Friday, 14 May 2004

re: Chemplex----Five-Year Review: Air Stripper Risk Tables

Hi, Nancy: Per your request, attached is our redo of the air emissions risk tables, using year 2000 data. As noted in the table footnotes, mass emissions have fallen since 2000, so risks would now be lower than those shown in the table.

Hope this is responsive.....Tom and Dave

> -----Original Message-----
> From: umezaki dave
> Sent: 14 May 2004 10:02 AM
> To: belick tom
> Subject: Air Stripper Risk Tables
>
>
> <<Air Stripper Risk Tables.pdf>>